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ANURA GURUGÉ is an independent technical consultant and author who specializes in all aspects of contemporary networking — in particular IBM-oriented networks. He has first-hand, in-depth experience in SNA-capable intranets, multiprotocol LAN/WAN internetworks, SNA/APPN/HPR, Frame Relay, Token Ring switching, ATM, Management, and the nascent xDSL technologies. He is the author of Reengineering IBM Networks, and the best selling SNA: Theory and Practice.

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MARCH 23, 1998 VOLUME 15, NUMBER 12

NetworkWorld

THE NEWSWEEKLY OF ENTERPRISE NETWORK COMPUTING

COMPAQ'S GIGABIT GRAB BAG

Gigabit Ethernet switches and NICs said to be on the way. Page 8.

MCI/WorldCom deal to go through ringer

By David Rohde and Denise Pappalardo
Washington, D.C.

Any talk of a merger cakewalk for WorldCom, Inc. and MCI Communications Corp. is over.

Now that the U.S. Department of Justice has requested detailed Internet traffic data from the merger partners and their big Internet competitors, approval of the deal is likely to be a long struggle.

But behind the scenes it is clear that the fight over the MCI/WorldCom deal isn't really about whether the merged company would have a stranglehold on Internet backbone traffic.

Instead, opposition to the merger is being drummed up mostly by the telephone industry's biggest labor union and the merger duo's biggest adversaries in the local exchange market.

Key players attacking the deal include the Communications Workers of America (CWA), the Rev. Jesse Jackson's Rainbow/PUSH Coalition, and the Consumer Project on Technology, a Ralph Nader group that also has been attacking Microsoft Corp.

See **Merger,** *page 64*

Sun to air Java device manager

Sun hopes this week's JavaStation release will help jumpstart the lagging network computer market. **Page 12.**

By John Cox
San Francisco

If you are a big telephone company and want to pass out millions of Java-based network computers (NC), set-top boxes or cellular phones, you've got a problem.

Namely, how do you configure, manage and update the wealth of software those devices require?

That's the question the Swiss PTT had for Sun Microsystems, Inc. And this week, at the JavaOne conference here, Sun will lay out

See **JavaOS,** *page 12*

Switch users in for QoS sticker shock

By Jim Duffy and Robin Schreier Hohman

As vendors tout their policy-based network capabilities, they're chomping at the bit to tell users about how they can guarantee quality of service (QoS).

But they're not anxious to tell users about another guarantee: The new features will require significant hardware upgrades that could cost tens of thousands of dollars.

Users looking to implement the IEEE 802.1p standard for QoS are going to have to replace current-generation LAN switches with new hardware, vendors and analysts acknowledged last week.

"It would require a forklift upgrade," said Kelly Carpenter, systems manager at Washington University's Genome Sequencing Research Center, in St. Louis, a large Cisco Systems, Inc. customer. "At some point you do have to bite the bullet and upgrade if it really is something that's going to help you out."

Upgrades are also in the offing

See **QoS,** *page 10*

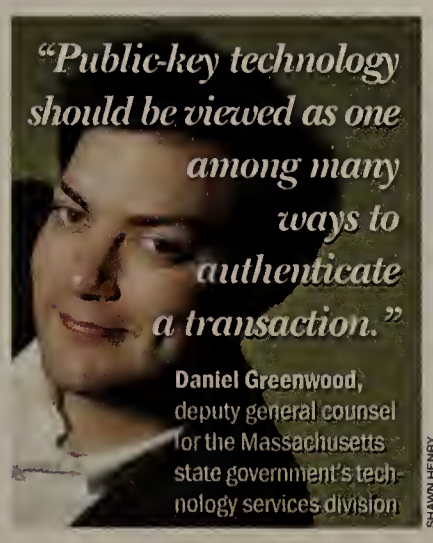
Certificates merit a look

By Ellen Messmer

Banks, universities, government agencies and even churches have begun handing out public-key certificates to employees, enabling individuals to digitally sign and encrypt e-mail and files.

And while early adopters are raving about improvements in internal and external communications security, they also are running into interoperability problems and seeing regulatory

See **Certificate,** *page 16*



Does this sound familiar? You have users all over the globe screaming for better access to the corporate net and hackers pounding on all the existing doors trying to get in. What do you do (other than lie awake at night sweating)?

Slow down and check out our Buyer's Guide to enterprise-class remote access server hardware, designed to help you find the product that strikes the best balance among price, performance and security needs.

For the review portion of the package, we beat on five boxes to determine how well they could handle multiple simultaneous connections. By the time the lines went quiet, Bay Networks, Inc. had emerged with the Blue Ribbon.

But the Bay entry may not be for everyone, so we've assembled info on 23 remote access servers in our Product Chart,

Review: Page 41.
Issues and Trends: Page 46.
Product Chart: Page 48.
Interactive Chart: www.nwfusion.com

along with an interactive online version that will help you pinpoint the product that best meets your needs. Refer to the Issues and Trends story for tips on the key high-end features to look for.

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InfoWorld February 2, 1998

magazines — the InfoWorld Product of the Year Award. But perhaps that's no surprise considering that the winning server is the ground-breaking ALR Revolution 6X6. The first industry standard server to support six Pentium® Pro chips. The first Intel® processor-based server to break the 10,000 tpmC™ barrier. And the TPC-C™ price-performance leader among all servers with more than four processors[1].

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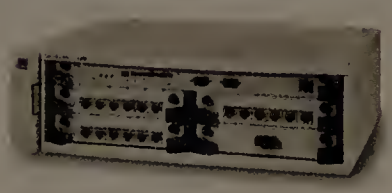

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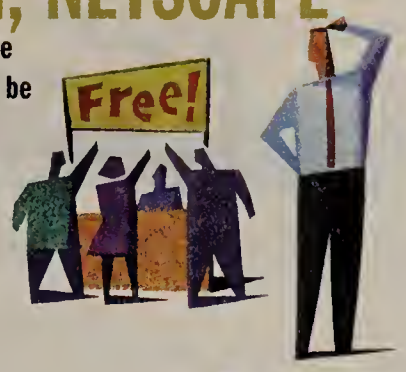
STEVE BORNS

NETWARE CHAMPION

Novell CEO Eric Schmidt has high hopes for NetWare 5.0. Our interview, page 24.

NICE TRY, NETSCAPE

Even free source code from Netscape won't be enough to derail Microsoft, according to columnist James Kobielus. Page 39.



PRICE-BUSTER

Foundry slashes prices on its switches and routers by up to 42%. Page 19.

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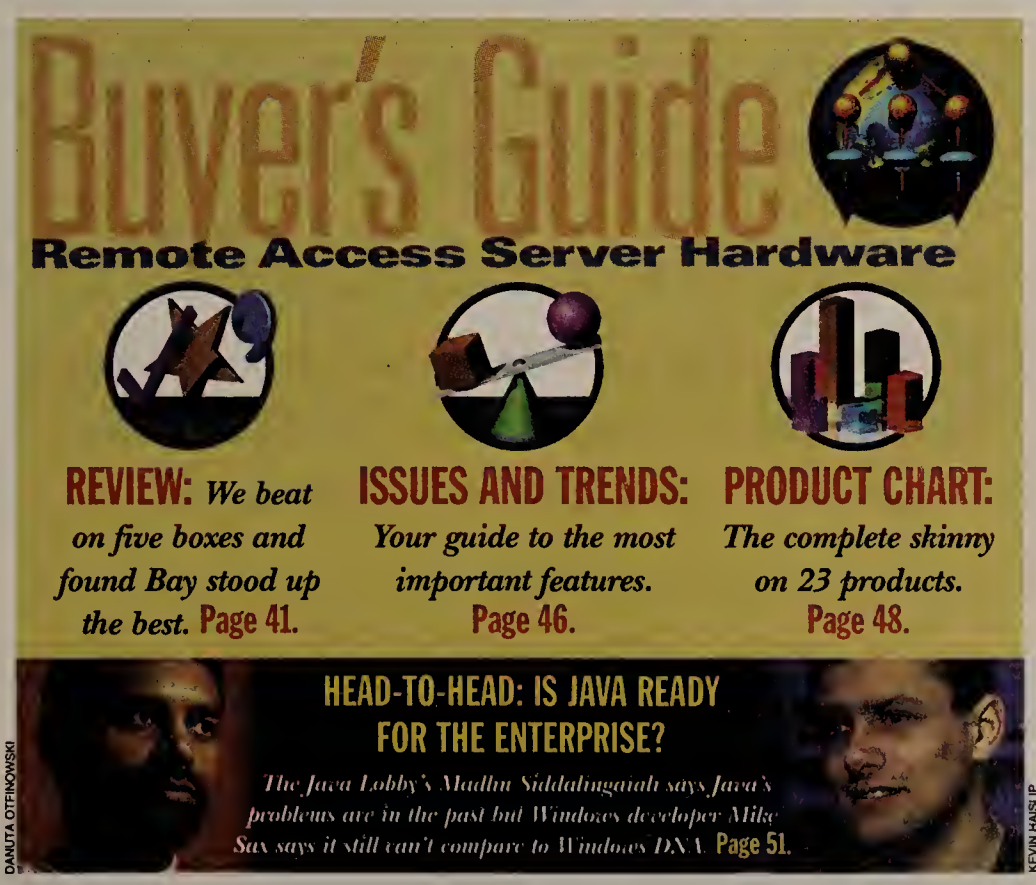

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This Week

Only on Fusion

Java. Is it ready for the enterprise? Participants in our latest Fusion Face-off will debate the topic this week. Read papers by Madhu Siddalingaiah, vice president of the Java Lobby, and Mike Sax, president of Sax Software, a component developer that chose to support NT in the enterprise. Then jump in with your own thoughts. **DocFinder: 6328**

Directories. Our editorial this week (page 38) urges readers with a need for sophisticated NT-based enterprise directory services to go with Novell's NDS for NT rather than waiting for Microsoft Active Directory Services. What do you think? Tell us — and other Fusion users. **DocFinder: 6334**

Keeping Current. Tera-fic or Tera-ble? We've barely gotten into Gigabit Ethernet and already some people are talking about Terabit Ethernet. Fred McClimans wants to nip this in the bud. **DocFinder: 6341**

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Volume I, Issue 3

IBM

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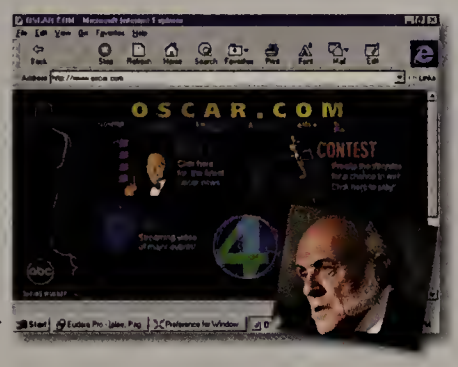
One e-mail administrator can support nearly twice as many users with an Internet-based messaging system than with a client/server-based system: 1,300 vs. 740 users. (Study by Creative Networks, Inc., reported in *Computerworld* 11/17/97, p. 57.)

News briefs, March 23, 1998

And the winner is . . .



■ The official Web site of the 70th Annual Academy Awards — www.oscar.com — tonight will offer continual coverage of Hollywood's big blast. Coverage of the festivities will begin at 7 p.m. EST, and the awards ceremony begins at 9 p.m. The site will offer surfers an overview of the nominees and an up-to-the-minute tally of winners.

3Com buys Lanworks for $13 million

■ Looking to boost its desktop management capabilities, 3Com Corp. last week said it acquired Toronto-based Lanworks Technologies, Inc. Lanworks' BootWare products include client/server network interface cards and software that lets IS staffers automate initial PC configurations, operating system upgrades and disaster recovery procedures.

Network Associates' sly security sales plan

■ Network Associates, Inc. last week came up with a crafty plan to skirt U.S. export laws on strong encryption so the company can easily sell its Pretty Good Privacy, Inc. (PGP) mail encryption software abroad. To do this, Network Associates is asking Swiss company Cnlab Software to develop its own version of the PGP software. Cnlab will pay Network Associates for the right to the PGP name but not the underlying technology. The U.S. government, which wants vendors to put key-recovery features into their products so the government can decrypt user data, is opposed to the Network Associates plan. However, the government left it unclear whether it might try to stop the deal through legal means.

Netscape's enterprise endeavors

■ Netscape Communications Corp. this week at the JavaOne conference will announce upgrades to its Application Server and Extension Builder products. The company said it would add Enterprise JavaBeans (EJB) support to its Application Server in the second half of the year. EJB is a Sun Microsystems, Inc.-defined way of letting developers quickly piece together applications using smaller JavaBeans components. Application Server is the first product to come from Netscape's acquisition of Kiva Software Corp. last year (*NW*, Feb. 9, page 41).

Netscape also will announce Extension Builder 2.1, which lets users link legacy IT applications to the Application Server. The package now will offer links to BEA Tuxedo, IBM MQSeries, CICS and IMS systems. Available in April, Version 2.1 will be priced at $4,995 per developer.

Government probing into Microsoft's Java practices

■ The U.S. Department of Justice's probe into Microsoft Corp.'s competitive practices may be spreading beyond the current Web browser integration flap and into the Java realm. According to sources at Microsoft, the Justice Department has served officials at archrival Sun Microsystems, Inc. with several "civil investigation demands," asking for information about Sun's dealings with the software giant. Sun declined to discuss the nature of the Justice Department inquiries, but confirmed that the company has been in contact with the Justice Department for almost two years.

Internet commerce vendors merge

■ CyberCash, Inc. and ICVerify, Inc. last week announced plans to merge and concentrate their combined efforts on offering Internet-based payment-processing software and services. Under the agreement, shareholders of ICVerify will receive $16 million in cash and 2.3 million shares of CyberCash common stock. ICVerify will become a division of CyberCash. The merger is subject to shareholder and government regulatory approvals.

Notes-Exchange race getting tighter

Lotus offers price enticements; Microsoft enlists Eastman for workflow, imaging support.

By Paul McNamara

Lotus Notes may still lead the fast-paced messaging/groupware race, but that object in its rearview mirror — Microsoft Exchange — is rapidly gaining ground.

A flurry of product announcements and market reports last week shed new light on what most messaging industry experts say has become a two-company contest for supremacy in the enterprise. Both Lotus Development Corp.'s Notes and Microsoft Corp.'s Exchange are selling like tickets to "Titanic," but market researchers said Notes' 5-to-1 advantage in installed base has dwindled to 2-to-1 since the end of 1996.

"It's a half-hearted attempt from Microsoft to try to patch something that looks and acts like Notes on top of an e-mail system," said Steve Layne, Lotus' vice president of messaging.

While the timing may have been coincidental, Lotus last week announced an upgrade of its own out-of-the-box document management software. A Lotus official said the company's Domino.doc 2.0 "brings us to parity" with established document management vendors.

Perhaps more important, the Cambridge, Mass.-based IBM subsidiary unveiled incentives to entice its 14 million cc:Mail customers to migrate to Notes, or at least stand pat and stay out of the growing Exchange ranks.

Lotus will discount Notes clients by about 30% and Domino Mail Server by 20% for cc:Mail customers looking to trade up. In addition, an upcoming maintenance release of the cc:Mail client will give customers the option of connecting directly to a Domino server.

Lotus officials insist that the company is doing a good job retaining cc:Mail customers. But finding defectors is not difficult.

Mike Dunn, manager of network services at Boston University, said he has been unimpressed with Lotus' attempts to keep his 3,000 cc:Mail seats.

"We haven't made a decision to go one way or the other," Dunn said. "[But] we are constantly amazed at the way Lotus treats its customer base. This is just another nail in the coffin."

Another company, Commonwealth Technology, Inc., almost certainly will switch its 160-user cc:Mail shop to an Exchange one, said Keith Coon, network manager at the Lexington, Ky. firm. One reason for the expected move is that the company has already migrated to Windows NT from NetWare.

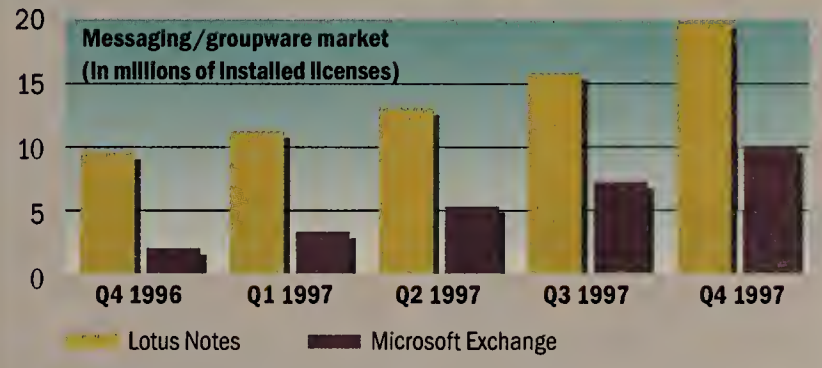
Lotus "has to keep it's eye on the ball," said Eric Arnum, editor of "Electronic Mail and Messaging System," a Washington, D.C.-based newsletter. But Lotus can still rightly crow over its sales growth and an installed base of more than 20 million seats, he said.

"In the fourth quarter, [Lotus] sold *four million seats*," Arnum said, adding, "there are only a handful of products that *have* four million seats."

Exchange sold 2.8 million seats in the fourth quarter, Arnum said. "Notes is not declining; its momentum is positive in every direction," Arnum added. ■

NOTES VS. EXCHANGE BY THE NUMBERS

While Lotus Notes remains atop the messaging/groupware marketplace, Microsoft Exchange has been steadily closing the gap in installed base.



SOURCE: "ELECTRONIC MAIL AND MESSAGING SYSTEM NEWSLETTER"

Microsoft last week kept the pressure on, joining Eastman Software, Inc. for the latter's introduction of document management, workflow and imaging entries built to run on Exchange. Technologies such as these have long been considered a Lotus strength and a Microsoft weakness.

"This represents the first real threat to the Lotus Notes franchise," said Gerry Murray, an analyst with International Data Corp., in Framingham, Mass. Priced at less than $200 per user and due to ship in the third quarter, Eastman's Document Manager for Microsoft Exchange makes "the [technology] gap between the Lotus camp and the Microsoft camp a whole lot smaller," he added.

Eastman, based in Billerica, Mass., is headed by former Lotus executive Bob Weiler. Lotus officials last week scoffed at the notion that Weiler and his Redmond allies had struck upon a combination that would change

Compaq ready to make Gigabit Ethernet splash

By Marc Songini

At long last, Compaq Computer Corp. is ready to spill its Gigabit Ethernet story.

The company next Monday will outline plans for Gigabit Ethernet cards and switches, according to sources.

While Compaq officials declined to comment, the company's entry into the market is no surprise. For the past year, the company has stated its intention to support the high-speed technology. Compaq, a founding member of the Gigabit Ethernet Alliance, also has issued white papers on the Gigabit Ethernet technology.

Industry sources expect Compaq to release client and server network interface cards (NIC). They said the cards may be made by another company. Sources suggested that company most likely will be Intel Corp. but could possibly be Jato Technologies, a Gigabit Ethernet chip and card maker.

Compaq also is expected to introduce at least one switch running at 12 ports or more, sources said. They added that the device probably will be sourced from Extreme Networks, Inc., a company Compaq has been known to work with. Indeed, Compaq displayed a version of Extreme's Gigabit Ethernet Layer 3 Summit device at NetWorld+Interop '97 in Paris. Extreme CEO Gordon Stitt declined to comment.

Compaq in the past has said that Gigabit Ethernet switches would cost about three times more than 100M bit/sec switches, which would translate to $900 to $1,000 per port. Gigabit Ethernet NICs also will probably cost three times as much as their Fast Ethernet counterparts.

E-commerce blast

Separately, Compaq this week will try to take a big bite out of the electronic commerce pie with a slew of hardware and software packages. The company will announce ProLiant E-Commerce Servers that come bundled with Microsoft Corp.'s Site Server Commerce Edition 3.0 software. High-end models will cost around $13,700.

Also new will be ProSignia and ProLiant Firewall Servers. These products come bundled with security software from Raptor Systems, Inc. They will cost about $6,000.

In addition, Compaq's Tandem subsidiary will bring its Internet Transaction Processing products to the table. They include iTP Virtual Store, a high-end server running Windows NT or Tandem's own Non-Stop operating system. ■

Cisco enhances routers to cut WAN costs

7500 and 7200 series routers also gain new ATM adapters, QoS support.

By Jim Duffy

San Jose, Calif.

Cisco Systems, Inc. last week unveiled enhancements to its high-end routers designed to reduce WAN costs and support new networked applications.

The Cisco 7500 and 7200 series router improvements include multichannel networking, ATM port adapter upgrades and quality-of-service (QoS) support.

Multichannel networking lowers WAN service and equipment costs by combining variable-speed channels over a single interface. QoS ensures that bandwidth is always available for mission-critical applications or time-sensitive, real-time traffic such as voice.

Cisco's multichannel port adapters for its 7200 and 7500 routers support up to 128 64K bit/sec DS-0 channels as well as T-1/E-1 circuits, or combinations of both. They also support T-3 and E-3 links.

Multichannel technology allows users to connect a central site, via leased lines or frame relay, to many remote sites at various speeds over a single interface. This alleviates the need for and the associated cost of configuring multiple central site router ports for each remote site access line, Cisco said.

The channelized T-3 offering appeals to PeopleSoft Corp., which has been looking to untangle a nest of DSUs/CSUs and V.35 cables connected to its fast serial cards and router.

"That's been reduced now to just a pair of DS-3 cables coming into the router," said Stan Christensen, senior network engineer at PeopleSoft, in Pleasanton, Calif. "It really has made troubleshooting and life a lot easier."

However, Christensen noted that the channelized interface does represent a single point of failure. "You lose that one cable, you pretty much lose your WAN," he said.

For users who choose ATM for WAN connectivity, the Cisco 7500 and 7200 now support a line of WAN-capable ATM port adapters. These adapters support DS-3, E-3 and OC-3 interfaces on single-mode or multimode fiber, and provide ATM traffic-shaping and available bit rate services for QoS.

Cisco has also added QoS support to its 7200 and 7500 routers via CiscoAssure software for prioritizing traffic by application. CiscoAssure is a policy-based networking initiative announced recently by Cisco (see story, page 27).

✆ Cisco: (408) 526-4000

Adapting to Cisco routers

Product/feature	Available	Price
Four-port T-1 multichannel port adapter	June	$7,250
Eight-port T-1 or E-1 multichannel port adapter	June	$11,600
One-port T-3 or E-3 multichannel port adapter	July (E-3), August (T-3)	$22,000
One-port DS-3 or E-3 enhanced ATM port adapter	April	$8,000
One-port single-mode or multimode OC-3 enhanced ATM port adapter	June	$10,000 to $12,000 (single-mode) or $8,000 (multimode)
CiscoAssure QoS software	March	Free

Cisco unveils LAN/WAN gateway

Cisco Systems, Inc. this week will fill out more of its voice/data integration arsenal with a new LAN/WAN gateway designed to bypass toll calls and enable new IP or telephony applications.

The Cisco 2600 line includes two models, the 2610 and the 2611. The 2610 features one Ethernet port, a network module, two wide-area interface card (WIC) slots and a single "advanced integration module" (AIM) slot, sources said. The 2611 includes all of the above, but sports two Ethernet ports.

The network modules can be 16- or 32-port asynchronous cards, or four- or eight-port synchronous/asynchronous serial boards. WICs can be T-1, 56K bit/sec or ISDN Basic Rate Interface cards, or two- or four-port voice and fax cards. The voice/fax modules are the same as those used in Cisco's 3600 series router.

The AIM cards can be hardware-based compression or encryption modules, sources said. The 2600 line also features IP routing and differentiated quality of service, depending on traffic type.

The 2600s are intended to provide branch offices with LAN-to-WAN call routing and switching so they can bypass long-distance tolls.

The two models also are designed to off-load processing from tandem switches, and to enable such applications as intranet videoconferencing, Internet fax and multivendor PBX integration.

"Cisco is pushing the corporate office out to the branch," said one analyst about the 2600 line.

The 2600s start at $2,000 and will ship in April.

–Jim Duffy

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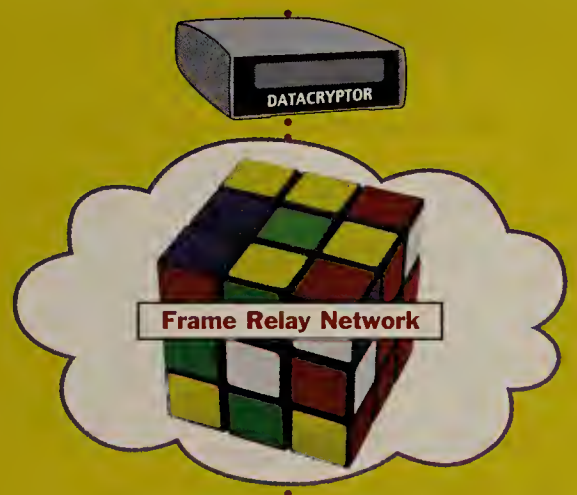

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Access to Multimedia Information Networks

RACAL

DSL carriers start cross country race

By Tim Greene

Newcomers specializing in broadband digital subscriber line (DSL) services are going national.

NorthPoint Communications, Inc. this week will announce initial services in California and will outline plans to enter more than seven other markets this year. Separately, DSL, Inc. spelled out its plans for a national DSL rollout that includes providing long-distance links over its own network.

And another DSL service provider, Covad Communications Co., last week aired its national rollout plan (*NW,* March 16, page 60).

While each company has slightly different offerings, the carriers all offer wideband dedicated access over regular copper telephone lines. Typically, these services are used for access to the Internet or corporate networks.

NorthPoint, based in San Francisco, is primarily wholesaling DSL access to Internet service providers at speeds ranging from symmetric 160K bit/sec to 1.04M bit/sec. ISPs in turn resell services to users.

But at least one user has bought a 486K bit/sec DSL pipe directly from NorthPoint, finding the service less expensive than buying a T-1 line. A T-1 line would have cost Employers' Medical Network, Inc., of San Jose, Calif., $1,500 per month and would have wasted a lot of bandwidth, said Keith Waldorf, chief information officer for Employers'. On the other hand, the symmetric DSL line costs $250 per month, he said.

Employers' is using the DSL link to tie its Web server to the Internet, replacing an ISDN line that was slow and unreliable. The company considered outsourcing management of its Web server, but that would have cost at least $350 per month and would have forced the company to give up some security.

Currently, NorthPoint offers services in the San Francisco area. The carrier plans to sell in Boston by May and in seven to 10 more cities later this year.

Meanwhile, DSL, Inc. is starting its push in the Midwest. The Waukesha, Wis., carrier is selling directly to users but also to ISPs, according to DSL CEO Ted Lasser. In addition to access lines, the company will offer long-distance service over its own leased fiber network, he said.

DSL's aggressive schedule calls for setting up shop in 78 cities within 15 months and selling one million lines by 2000.

The company has filed applications for competitive local exchange carrier status in 33 states. Prices range from $449 per month for a 1.6M bit/sec asymmetric service to $1,800 per month for a 7M bit/sec asymmetric service.

Three hotels owned by Montclair Hotels Corp., in Wisconsin, are linked by four 1.6M bit/sec DSL lines, according to Mitch Morrison, controller for the Paper Valley Hotel, in Appleton, Wis. The hotels expect to recoup their investment within 18 months by eliminating dial-up costs and holding on to business that might be lost as a result of slow lines, Morrison said.

✆ NorthPoint: (415) 403-4003; DSL: (414) 717-2000

New places to buy DSL

PROFILE: NORTHPOINT COMMUNICATIONS, INC.		PROFILE: DSL, INC.	
Based:	San Francisco	Based:	Waukesha, Wis.
Founded:	August 1997	Founded:	March 1997
Employees:	48	Employees:	41
Funding:	$21 million, combination of venture capital from Benchmark Capital, Greylock Capital, Accel Partners and lease funding	Funding:	$5 million private, initial public offering expected later this year
Services:	Dedicated access lines from 160K bit/sec to 1.04M bit/sec	Services:	Dedicated access lines from 256K bit/sec to 7M bit/sec
Competitors:	Covad Communications, DSL, Inc., regional Bell operating companies and GTE	Competitors:	Covad Communications, NorthPoint, RBOCs and GTE

Nortel has a DSL of its own

Nortel this week will announce modems that support a new digital subscriber line (DSL) technology which is set apart from other flavors of DSL by posing fewer deployment problems.

The company's EtherLoop technology supports high-speed access over regular telephone lines, as do other DSL variants. But EtherLoop does so without disrupting services carried on nearby wires within carrier networks.

In addition, EtherLoop works over poor quality circuits that would pose fatal problems to other varieties of DSL. And EtherLoop is splitterless, which means it doesn't require a separate device at the customer site that splits the data stream on the wire.

Nortel will deliver its EtherLoop technology as a customer modem called Elite 1 and a service provider multiplexer called Elastic Modem (ELMO), which comes in models supporting either eight or 48 lines. Because the lines are silent unless they are transmitting data, the ELMO 48 device requires no more processing power than the ELMO 8, said Scott Ryan, senior marketing manager for Nortel's Elastic Networks division.

The new Nortel technology supports symmetric bandwidth of 10M bit/sec over very short loops. That drops off to about 5M bit/sec at 5,000 feet and to less than 2M bit/sec by the time it gets to 12,000 feet. After that, there is a gradual decline to 800K bit/sec at 21,000 feet, Ryan said.

Each customer modem and each port on an ELMO will cost $350. Full production is scheduled by year-end, Ryan said.

✆ Nortel: (770) 661-4107

— Tim Greene

QoS

Continued from page 1

for the 802.1Q virtual LAN (VLAN) protocol, but depending on the vendor, it may only entail software.

The 802.1Q specification is a four-byte field added to an Ethernet, token-ring or FDDI frame. It holds VLAN membership and security information. The 802.1p protocol — which is now in the IEEE's 802.1d committee — is a four-byte field that defines up to eight levels of transmission priority. It is intended for applications such as multicast video or real-time desktop videoconferencing and is expected to be ratified late this year.

Both protocols are intended to enable multivendor Layer 2 switches to distinguish incoming traffic classes. In addition to interpreting 802.1p and 802.1Q bits, LAN switching equipment must support multiple priority queues. Most LAN devices do not have these capabilities, acknowledged Rick Forberg, product manager of ATM Internetworking at 3Com Corp. (*NW,* Nov. 10, 1997, page 49).

But 3Com, which last year announced its TranscendWare policy-based network capabilities, said the newest generation of its CoreBuilder and SuperStack II switches support the Application Specific Integrated Circuits (ASIC) and multiple queues necessary for 802.1p and 802.1Q. Four of the seven models of those new switches are now shipping.

But six models of the older generation of SuperStack II switches and three models of the CoreBuilder family need upgrades or have to be replaced altogether if they are to process 802.1p and 802.1Q bits.

"There's always going to be a new generation of technology and there's going to be new capabilities in it. That's the way the world works," said Frank Fuller, 3Com's director of systems marketing.

That's a bitter pill for Lockheed Martin to swallow. Lockheed, in Pittsfield, Mass., bought $200,000 worth of CoreBuilder 5000s 18 months ago to support 1,200 users in 12 VLANs. But the company did not foresee an upgrade coming this soon, and 3Com didn't let on that there would be one, said Peter Bissonnette, a communication design analyst for Lockheed.

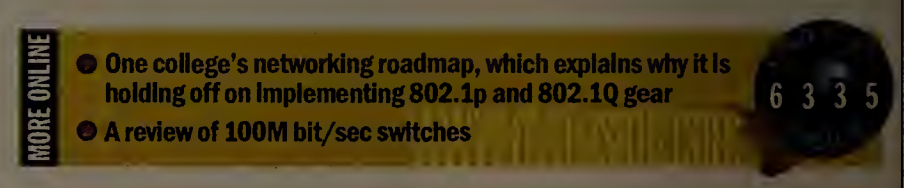
After asking about 802.1p and 802.1Q support in the CoreBuilder 5000, 3Com told him a hardware upgrade would be required and he would have to pay for it, Bissonnette said.

"If I were to go out and buy today I would absolutely insist on a tradeup to a compatible switch module when it's released," Bissonnette said. 3Com will support 802.1p and 802.1Q in a new Gigabit Ethernet downlink for the CoreBuilder 5000, but Fuller did not say when that would ship.

Hardware upgrades also are in the offing for some of Cisco's Catalyst switches. Cisco recently announced its CiscoAssure policy network plan (see story, page 27).

"It is true that to get wire-speed [802.1p and 802.1Q] trunking, you have to embed the trunking capabilities in hardware," said Jayshree Ullal, Cisco's vice president of enterprise marketing. "There's no question of hardware change-out [in switches where] trunking was not offered as an option."

For 802.1Q support, Cisco has software that maps its proprietary InterSwitch Link protocol to 802.1Q without degrading the performance of Catalyst 3000 and 5000 switches, Ullal said. But 802.1p support will require new modules for these switches.



Bay Networks, Inc. users are in the same boat. Bay is shipping 802.1Q hardware in its new Accelar switches, but others will require a hardware or software upgrade, or both, said Paul Woodruff, Bay's director of product management.

Cabletron Systems, Inc.'s SmartSwitch 6000 switch for the wiring closet and SmartSwitch 2000 for workgroups have been 802.1p- and 802.1Q-compliant since December, said Trent Waterhouse, a senior architect at Cabletron.

Users who bought either switch before December have been advised to download a firmware upgrade from Cabletron's Website. ■

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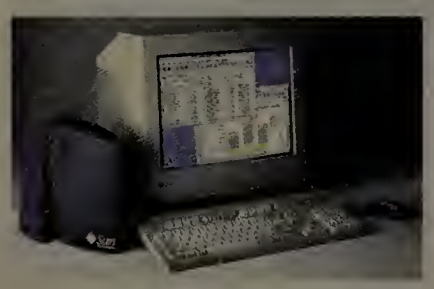
NCs prepare for an uphill battle

Sun looks to get Java computer market going with JavaStation release.

By John Cox and Scott Lajoie
San Francisco

The company that helped launch the Java-based network computer (NC) idea is finally launching a product. But it comes at a time when the NC's future is murky at best.

Sun Microsystems, Inc. this week at the JavaOne show here is announcing the general release of its JavaStation. But in the more than two years since the device's extravagant unveiling, it has changed greatly from its thin-client beginnings.



Sun's long-awaited JavaStation *is set to ship.*

Compared with the first beta units, today's JavaStation has a much more powerful Sun microprocessor, more memory, and software to connect to multiuser Windows NT servers running Windows applications. However, there are few important third-party applications designed for JavaStation users.

In addition, there seems to be a growing impression that Java still lacks the maturity, performance and associated services needed to support applications that companies can rely on for their day-to-day operations.

Counterattack

Finally, Microsoft Corp.'s twin counterattacks on the NC concept are paying off. The first was the ill-fated NetPC, a sealed Windows PC that could be loaded and managed from remote servers.

Burlington Coat Factory Warehouse, Inc., based in Burlington, N.J., halted its rollout of Neoware, Inc.'s NCs for two months, largely in response to the NetPC.

"The NetPCs were looking more and more appealing, so we went back and talked to our NC supplier and gave [the company] some of our concerns, one of which was that the browser and Java Virtual Machine updates seem to lag in the NC market, whereas in a Windows environment, one has access to the latest browser," said Michael Prince, chief information officer of the clothing retailer.

Prince has decided to continue deploying more NCs, but remotely re-evaluate the situation at some point.

The second Microsoft NC counterattack is the Windows Terminal Server (WTS), code-named Hydra, due out by June. WTS is a multiuser version of Windows NT Server 4.0, which hosts applications and serves them to a new breed of Windows terminals.

WTS gives users a pure Windows interface and LAN or WAN access to corporate applications, such as third-party financial or human resources software packages.

"In many cases, customers don't have to alter their net structure," said William Botti, president of Computer Networks, Inc., a systems integrator in Pleasanton, Calif.

"In the long term, and by that I mean three years, WTS and terminals will outrun the Java NC by 100 to 1," Botti said.

That's largely because the impact and benefits of a terminal approach are almost immediately visible. NC benefits are much harder to see, according to Scott Gorcester, president of MooseLogic, Inc., a systems integrator for Citrix Systems, Inc.'s WinFrame server, on which Microsoft WTS is based.

"There is a lot of confusion as to what to use NCs for," he said. "There is not enough Java application support."

Partly in response, Sun's JavaStation for now is being aimed at clearly defined applications in specific industries. A typical case study involves JavaStations replacing old Unix or mainframe terminals in call centers, retail chains and distribution companies.

Legacy access

Typical of other NC sites, Burlington Coat Factory uses the devices as terminals. "We use the NCs to get at legacy stuff, but the real goal is to get a robust but easy-to-administer browser out there as the ubiquitous interface to all of our corporate applications," Prince said.

That movement is taking a lot longer for the industry than was predicted two years ago by NC advocates such as Oracle Corp. Chairman Larry Ellison and Sun's own CEO, Scott McNealy.

"Our pitch to enterprise customers is: write your applications in Java," said Bud Tribble, chief architect for Java systems at Sun. "Once you decide to do this, then you can decide on the desktop option." ■

DEBUTING AT JAVAONE

Sun won't be the only company making noise at JavaOne. Here's a sample of expected announcements:

Vendor	Announcement
DASCOM	New version of IntraVerse, security and management software for intranets, extranets and electronic commerce
IBM	Adding Java support for TXSeries online transaction software and MQSeries messaging middleware; introducing TSpaces, middleware enabling small devices and heterogenous clients to communicate with network backbones
Persistence Software	PowerTier/J, Java application server based on JavaSoft's Enterprise JavaBeans technology
PreEmptive Solutions	Dash-O Pro, software for speeding the performance of Java applications by stripping them of unused code
Schlumberger Electronic Transactions	Free beta version of Cyberflex Multi 8K Simulator tool for speeding development of Java-based smart card applications

HP jolts Java market

Hewlett-Packard Co. wants to break the lock that Sun Microsystems, Inc. has on Java.

In a move that stunned industry observers, HP last week said it has developed its own Java virtual machine. The company signed up Microsoft Corp. to use the new Java technology in its Windows CE thin-client operating system.

The move puts HP on a collision course with Sun to control the evolution of Java and could ultimately split the Java world into rival factions — the kind of factions Java's open technology once promised to eliminate.

The action also reversed HP's current strategy of working with Sun to develop Java products.

"HP didn't want Sun to control what will be a key technology for HP," said Dave Folger, program director at META Group, Inc. HP is banking on Java-based products to be its bread and butter in the coming years. "And this does break the lock that Sun has on Java market," he said.

Folger said HP developers essentially reverse-engineered the popular programming language, using Sun's Java specifications as a foundation.

"They got a couple of manuals on how it works, put engineers in a room with no Sun equipment and rebuilt Java," he said.

—Sandra Gittlen

JavaOS

Continued from page 1

its answer — an answer that should apply to any company looking to roll out Java across an enterprise network.

For the first time, Sun engineers will reveal details of a new configuration architecture, called JavaOS Platform Services (JPS).

Software developers and network administrators can use JPS programs to assign applications to Java-enabled network devices or classes of device.

Information about the application assignments is then stored in a client/server database, called the Java System Database. The other JPS tools use this information to download or update the client software, including programs such as device drivers and network interfaces.

Java today downloads small applets that run on a client Java Virtual Machine, often in a Web browser. But there is no standard way to remotely and automatically configure devices such as NCs or set-top boxes with the variety of software they need. Sun engineers created JPS as a set of extensions to Java to make this possible.

The key to JPS is the distributed Java System Database, part of which runs on the client device, and which keeps track of the client's software inventory. A larger version runs on one or more servers, along with a simple graphical administrative interface. In effect, the database acts like a kind of directory service for client software that can be run on various Java-enabled devices.

JPS is currently in alpha test and is scheduled for release this summer. Sun also will publish about 150 pages of documentation and sample code via its Web site.

Currently, JPS runs on the JavaOS and Sun Solaris operating systems. It is being rewritten to run on 32-bit Windows platforms as well.

The specification also has been submitted to The Open Group standards organization for consideration as part of the Network Computer Reference Profile, which is a set of standards and APIs used to build NCs.

Eventually, Sun's JavaSoft arm may include JPS as part of a future release of the Java Development Kit.

Two parts of JPS, the database and the program loader, last year were embraced by a consortium of big retailers to create a Java-based specification for a new generation of networked point-of-sale devices, according to Troy Toman, group marketing manager for SunSoft, Inc., which controls the development of JavaOS.

The specification is an alternative to one the group had already made based on Microsoft Corp.'s NT Registry and OLE interfaces. With these JPS tools, the retailers and their equipment suppliers will be able to create a standard way to remotely configure or change the software configuration of point-of-sale devices.

"This architecture lets you plug and play any network computer with any [Java-enabled] server," Toman said. ■

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Novell shooting for database connectivity

By Christine Burns
Provo, Utah

Novell, Inc. last week teamed with start-up B2 Systems, Inc. to offer NetWare-based software that gives users easy access to multivendor databases.

Novell SQL Integrator for NetWare sits on a NetWare 4.X server and for the first time gives Novell users access to data stored in databases from companies such as IBM, Informix Software, Inc., Oracle Corp., Microsoft Corp. and Sybase, Inc. The package also lets users read and write information across those data stores.

While Novell SQL Integrator runs on NetWare, it also will support most major databases running on Windows NT, Unix, Digital VAX and IBM VMS machines.

Until now, Novell users could only access flat-file databases from BTreive Technologies, Inc.

Novell officials say the SQL engine makes it easier for end users to query database information and conduct database transactions without having to install more costly gateways offered by database vendors.

"They are not breaking into new markets here," said Mike Sun, an analyst with Giga Information Group in Westport, Conn. "They've simply managed to find a cost-effective way for existing users to integrate industry-leading systems into their NetWare networks."

Richard Bassin, president of Santa Barbara, Calif.-based B2 Systems, said Novell SQL Integrator will reduce corporate application development cycles by eliminating the need to build interdatabase hooks into applications. Instead, developers write applications that make calls to the SQL engine using standard APIs such as Open Database Connectivity or Java Data- base Connectivity. The product collects data from multiple databases automatically.

Novell SQL Integrator was built by B2 Systems and licensed by Novell.

In beta now, the product will be sold via the Novell channel for $6,495 per five-person server license when it ships in May. Additional user connections are $95.

✆ Novell: (800) 453-1267

Certificate

Continued from page 1

hassles on the horizon.

While public-key infrastructure (PKI) products and services are available from a host of companies, organizations that have experimented with the technology say customers may find themselves getting locked into a particular vendor's offerings.

"Most [of this] equipment is not interoperable," said Paul Ma, program manager for the IT security development group at the National Aeronautics and Space Administration.

Setting up shop

Most companies adopting PKI technology are doing so in one of two ways: They are setting up shop as certificate authorities (CA) or outsourcing the job to PKI service firms such as VeriSign, Inc. and Digital Signature Trust Co.

Setting up shop as a CA basically involves installing certificate management and directory servers and complementary desktop software, such as Web browser plug-ins. Certificate management servers generate certificates, revoke them and perform other tasks. Certificates are stored in the directory server. According to product vendor Entrust Technologies, Inc., companies can expect to pay at least $10,000 per server and anywhere from $1 to $75 per user.

Organizations such as NASA, which plans to become its own CA, have found a lack of interoperability among PKI components, such as CA servers, and directory servers based on Lightweight Directory Access Protocol technology. Ma said these pieces are not as standardized as vendors would lead customers to believe.

The interoperability problems mean that a certificate based on one vendor's technology often can't go through a routine online validation check at a CA server from another vendor to ascertain whether the certificate has been revoked.

"There's fighting between the CAs to get market share," said Ma, who has spent years testing software from Entrust, VeriSign, GTE CyberTrust Solutions, Inc., Microsoft Corp., and others.

"Entrust and VeriSign have loaded up their certificates to work only with their CA," Ma claimed.

Work at the Internet Engineering Task Force on a standard called the Public-Key Infrastructure Exchange-3 is supposed to take interoperability between CA servers to a higher level. But the commercial sector, particularly banks, will be the driving force in getting the situation straightened out, Ma predicted.

Despite interoperability headaches, early adopters said public-key technology is still attractive.

"There's nothing else like it — it has no competition," said Roger White, MIS director at NationsBank, which intends this summer to hand out digital certificates based on VeriSign technology to 30,000 employees.

But White admitted there are kinks to work out with PKI. NationsBank last Friday joined dozens of other financial institutions, industry vendors and government agencies in Washington, D.C. for a private meeting of the Bankers Roundtable, a financial industry trade group, on the subject of public-key technology.

One issue that vendors need to address is how to handle PKI end users who over time are issued more than one certificate, White said. It isn't easy for client software to search a directory to find the right public-key certificate, he added.

"I'm telling my technical people — make room for a key ring for multiple certs," White said.

Ma concurred. "A major issue is multiple certificates," he said.

PKI believers

But when PKI works, it works.

The Church of Jesus Christ of Latter-day Saints, based in Salt Lake City, has handed out public-key certificates to church administrators in its offices in Australia and the U.K. This lets administrators send digitally signed Novell, Inc. GroupWise messages asking to open new bank accounts or make funds transfers.

The electronically signed messages replace a fax-based system. "With fax, we'd want to know if the request was legitimate and we'd call them to confirm it," said Ray Anderson, director of treasury services at the church.

This wasn't very convenient, particularly in far-flung areas of the world. The church plans to have 11 more international offices up with digital certificates by year-end, with a total of 38 next year. Digital Signature Trust is operating the CA server for the church, which is using Entrust's desktop suite for GroupWise.

In Massachusetts, the state's Online Government Task Force two weeks ago issued a report calling for the use of public-key certificates, according to Daniel Greenwood, deputy general counsel for the state's technology services division. But that doesn't mean the state will be handing out certificates to all its residents and businesses any time soon.

"Public-key technology should be viewed as one among many ways to authenticate a transaction," said Greenwood, who served as chairman of the task force. The state has taken pains to conduct a cost-benefit study to gauge where certificates might fit in, and the answer so far has been that many applications don't really need them.

"In some cases, the overhead of building a huge PKI is unnecessary," Greenwood said.

Still, the Massachusetts Division of Banks — the agency that handles a huge regulatory paperflow between banks and the state — has begun using certificates to exchange secure, authenticated bank filings electronically in a pilot program with GTE CyberTrust.

One thing Greenwood does not want to see is state or federal licensing of CAs. But he is in favor of developing industry guidelines on CA operations.

This work has just begun in the CA Ratings and Trust Task Force, set up under the National Automated Clearinghouse Association (NACHA).

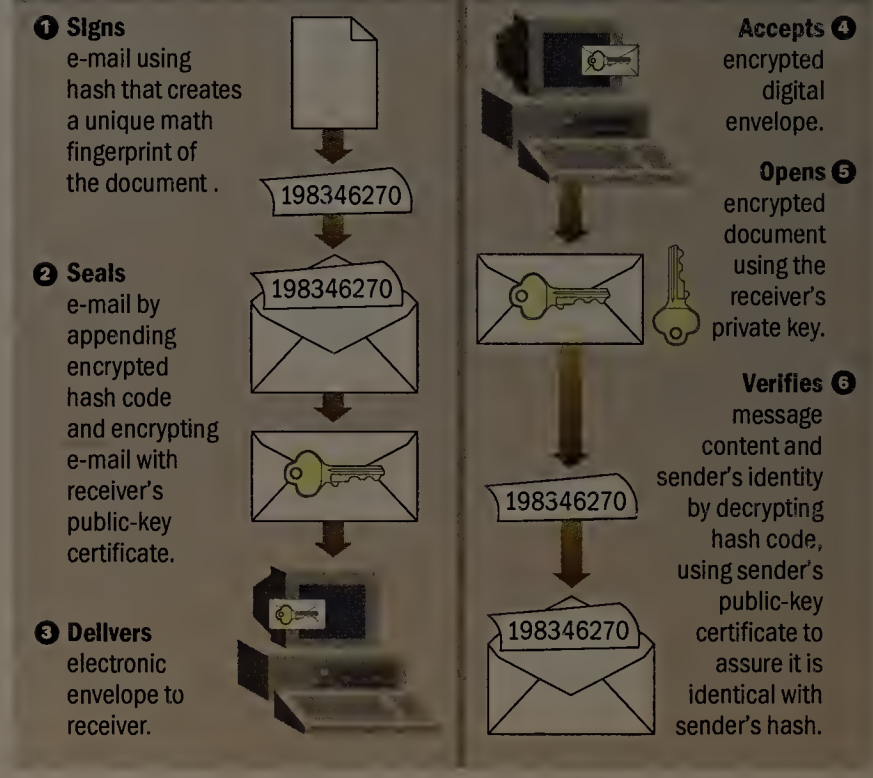
A somewhat similar effort is underway within the American Bar Association's Information Security Committee, according to Michael Baum, the committee's chairman and VeriSign's policy advisor.

At the committee's next gathering, which starts April 5 at the Patent & Trademark Office in Crystal City, Va., the group will spend three days working on proposed "Guidelines for Certificate Policies and Accreditation Criteria."

Citibank N.A., Visa U.S.A., Inc. and groups such as the Bankers Roundtable are leading the charge against CA licensing. ■

Keeping documents safe with public-key encryption

Groupware, file transfer, e-mail and even database servers can all use public-key encryption technology. Here's how to use the technology with e-mail:



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Briefs

■ **Hewlett-Packard Co.** *last week announced a collection of aggressively priced managed and unmanaged* **10Base-T and 100Base-T hubs.** *HP is rolling out four 10M bit/sec hubs — two 12-port models and two 24-port models. An unmanaged 12-port version costs $299.*

HP also introduced one 100-Base-T hub, dubbed the Advance-Stack 100Base-T 24TX. It costs $1,699.

Separately, HP last week introduced a **PC server for Windows NT** *workgroups. The NetServer E50 comes with an Intel Corp. Pentium II 300-MHz or 333-MHz CPU, an ultra-wide SCSI controller and an HP SureStore T4i tape drive.*

The server will cost about $2,025 and will ship by fall.

✆ HP: (800) 752-0900

■ *In an effort to push* **Windows NT Workstation** *onto more corporate desktops,* **Microsoft Corp.** *last week announced an enhanced service option for users who buy NT Workstation 4.0. The company is offering 90 days of free technical support for all new NT Workstation 4.0 installations.*

✆ Microsoft: (425) 882-8080

■ **Banyan Systems, Inc.** *last week announced a* **Year 2000-compliant** *version of its network operating system. VINES 8.5 includes Lightweight Directory Access Protocol support for Banyan's StreetTalk directory service, the StreetTalk Explorer management tool and an enhanced file system. The upgrade also will include Year 2000-compliant client software for Macintosh and Windows NT, 95 and 3.1 machines.*

VINES 8.5 will ship on April 3 and is free for all customers enrolled in Banyan's software subscription program.

✆ Banyan: (508) 898-1000

Windows thin-client products nearly ripe

Microsoft and Citrix release new beta software for setting up multiuser Windows NT servers.

By John Cox

New beta releases of two key thin-client server products are holding out the promise for badly needed performance gains and some important management enhancements.

Microsoft Corp. has begun shipping the second beta release of Windows Terminal Server (WTS), a version of Windows NT 4.0 designed to give multiple terminal users access to centralized applications.

At the same time, partner Citrix Systems, Inc. issued the second beta edition of its pICAsso software, which runs on top of WTS. The pICAsso software lets an array of client devices access WTS via the Citrix Independent Computing Architecture (ICA) protocol. The product also can be used to balance traffic loads across WTS servers and to configure and administer ICA clients.

Separately, hardware vendors Boundless Technologies, Inc., Network Computing Devices, Inc. and Tektronix, Inc. have unveiled Windows-based terminals (WBT). These devices run a leaner-than-usual version of the Windows CE operating system and use Microsoft's Remote Desktop Protocol (RDP) to connect to WTS machines and the applications running on them.

Microsoft officials said users of the company's new beta software will experience improved performance. Microsoft has made RDP smarter about how and when it caches information from the server. Neither Microsoft nor the beta sites have conducted benchmark tests yet to determine how much better RDP performs.

Users of the first beta version of WTS said Microsoft's communications protocol was noticeably slower than Citrix's when used over WAN links, though the protocols were comparable on a LAN.

The second beta release of pICAsso also should improve performance. Citrix has introduced a feature called SpeedScreen, which creates a shortcut for displaying screens on client devices. The result is less network traffic and faster screen painting.

Management boost

New features in the Microsoft and Citrix products will make administering WTS easier for customers. Jeff Baker, lead systems programmer for Harris Corp., a Melbourne, Fla., electronics manufacturer, is testing WTS as a replacement for Citrix's WinFrame server. Harris currently uses WinFrame to let 350 PC users across North America access PeopleSoft, Inc. human resources applications running on a central server at headquarters. WinFrame is the product on which the WTS technology is based.

"I don't want to have to touch these clients in any way [to use WTS]," Baker said.

With the new pICAsso release, administrators will be able to configure ICA clients via a central server, then use the new Client Update Utility to distribute software to clients over the network.

The new WTS release now lets administrators move large numbers of files over multiple servers without having to change the applications that rely on the files. The beta software also has new scripts that can identify potentially problematic code within applications running on WTS machines.

Neither Microsoft nor Citrix has announced pricing or licensing terms for their multiuser server products.

WTS and pICAsso remain on schedule for release by June. ■

HERE COME THE WINDOWS-BASED TERMINALS

Network Computing Devices' ThinStar is the first commercially available Windows CE-based thin client optimized to access Windows applications on multiuser Windows NT servers.

Foundry dropping Gigabit Ethernet prices

By Robin Schreier Hohman
Sunnyvale, Calif.

Looking to spark sales of its high-speed switches and routers, Foundry Networks, Inc. last week announced price cuts of up to 42% across its product line.

The company is slashing prices on its all-Gigabit Ethernet TurboIron Switches and TurboIron Switching Routers. For instance, the company is dropping the price on its four-port, all-Gigabit Ethernet TurboIron Switching Router by 42%, to $11,695.

Foundry is also reducing the price of its four-port, all-Gigabit Ethernet TurboIron Switch by 38%, to $7,495 — less than $1,900 per port. A Foundry spokeswoman said the street price could dip as low as $1,500 per port.

The cuts make Foundry's Gigabit Ethernet gear much more price competitive with products from companies such as 3Com Corp., which sells its 12-port SuperStack II 9300 switch for $1,300 per Gigabit Ethernet port.

"It's a momentum-building move," said Eric Hindin, a director at The Yankee Group, in Boston, about Foundry's price cuts. With the IEEE about to ratify a Gigabit Ethernet standard, and established internetwork equipment makers rolling out new high-speed network gear, "the window of opportunity for Gigabit Ethernet is starting to close for a lot of start-ups," Hindin said. "[Foundry is] trying to get attention and catapult itself into a position of prominence," he added.

Foundry *is slashing prices on its TurboIron devices.*

Foundry also is cutting the price of its 16-port 10/100M bit/sec FastIron Workgroup Switch by 28%, to $3,595. Customers also will be able to buy the switch with one or two Gigabit Ethernet ports. The prices for those products will be $4,995 and $6,245, respectively.

In addition, Foundry has rolled out a 24-port version of the switch, also with a one- or two-port Gigabit Ethernet uplink option. The base switch costs $4,595.

Foundry is also cutting the prices for its FastIron Backbone Switch and NetIron Switching Router lines. A 16-port 10/100M bit/sec FastIron Backbone Switch will cost $6,995, down 22%, while the price of its 16-port 10/100M bit/sec NetIron Switching Router will drop by 18%, to $8,995. Other versions of these products will cost up to 38% less.

The company's pricing strategy has impressed customers.

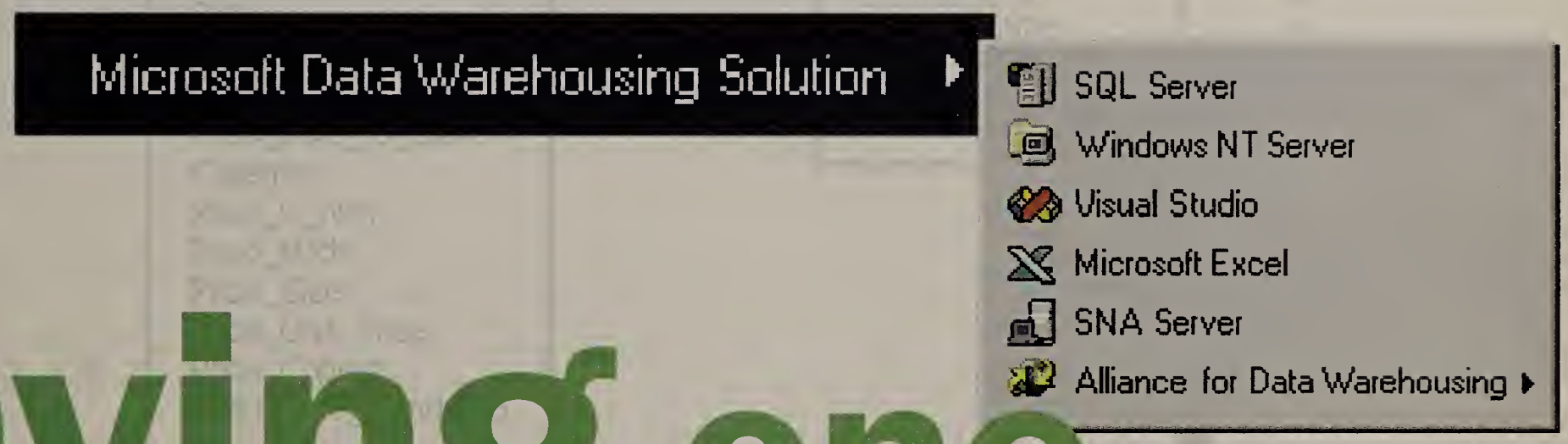
"We'll probably buy more routers and workgroup switches," said Brian McNab, network administrator at the *Miami Herald*, which already has installed five FastIron Workgroup switches with gigabit uplinks, and two NetIron Switching Routers.

McNab said he'll also buy more devices once Foundry releases software enabling him to route AppleTalk traffic.

Foundry's new prices are effective April 2.

✆ Foundry: (888) 887-2656

There's a big difference between wanting a data warehouse and



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WIRED WINDOWS

Another reason why you don't need network computers

A few months back, my friend Nick Petreley, editor of sister publication *NC World*, roped me into writing an article in defense of the PC.

The only way to describe the experience is to ask you to imagine going into a Christian church on Sunday morning and delivering a guest sermon defending the devil as simply misunderstood.

So you can imagine my surprise when I looked at the current issue of *NC World* and discovered that Nick had written an article titled "The network computer's dirty little secret" (www.ncworldmag.com/ncworld/ncw-03-1998/ncw-03-straypackets.html).

The gist of the piece is that the reason NC manufacturers are reluctant to send out review machines is that NC servers are so difficult to set up. Nick suggests that IBM approach a few key customers and offer to have its best engineers go in and set up all the server-side software customers need to make an NC network work. In other words, he thinks IBM and other NC backers need to get aggressive in showing customers the benefits of NCs.

Of course, you as the customer have another easier option: Microsoft's Windows Terminal Server, code-named Hydra.

Developed in partnership with Citrix, Windows Terminal Server runs on a Windows NT Server 4.0 platform and provides access to multiple users. Clients running Windows NT, 95 or 3.11 (and soon a new breed of terminals running Windows CE) can access the NT Windows Terminal Server-based applications.

Dave Kearns

And with the addition of Citrix's pICAsso client, almost any desktop machine — 16- or 32-bit Windows machines, Java-based devices, Macintoshes, etc. — can operate in the familiar 32-bit Windows environment.

Additionally, pICAsso adds the ability to build server farms by load balancing Windows Terminal Servers.

So you get to keep all of your current client hardware, you get to run the latest 32-bit software, and you can control it all with your familiar NT administrative and management tools.

Yes, NT Server has well-documented faults. But then again, what do you really know about all these new NC servers?

And now it turns out that you may need to bring in specialized support personnel just to make your NC network run as promised. You don't need the hassle, especially when there's a solution close at hand that you're already familiar with.

As I've said all along, NCs will have their place. But it will be a small one.

Kearns, a former network administrator, is a freelance writer and consultant in Austin, Texas. He can be reached at wired@vquill.com.

Tip of the week

I'm at Novell's BrainShare conference this week, looking into rumors that Novell and Microsoft are about to bury the hatchet and work closely together on Windows NT-NetWare integration. If you're at the show, too, drop me a note on the BrainShare network at dkearns95.

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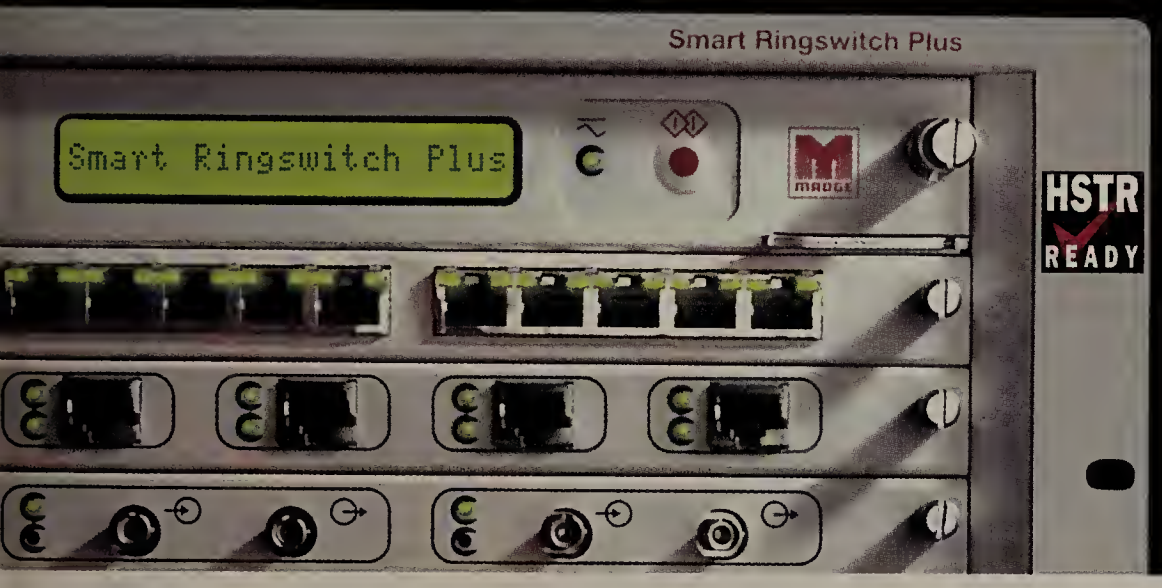

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Madge Networks

CEO Schmidt survives his first year at Novell

Top executive is fired up about NetWare 5.0's chances, says NOS performs far better than Windows NT.

Q&A

When Novell, Inc. last March tapped Java visionary Eric Schmidt as its CEO, the company's image badly needed a makeover and its strategic direction needed, well, direction.

Schmidt recently spoke with *Network World* Editor in Chief John Gallant and Senior Editor Christine Burns regarding the steps he's taken and the lessons he's learned over the past 12 months.

What do you like about being CEO?

The people, the products and the business. Speaking as a soon to be sophomore CEO, the thing that drives me crazy is surprises. So I put in place a much more rigorous management structure to try to control the company more tightly. With the expectation of that continuing to work, it is going to be a lot of fun.

PHOTOS: STEVE BORNS

What is the key thing you've learned personally?

There is a difference between being chief technology officer (CTO) and CEO. As CTO you get to sit around and have lots of opinions and you don't face the consequences of those decisions. As a CEO you do. That rigor is seriously intense.

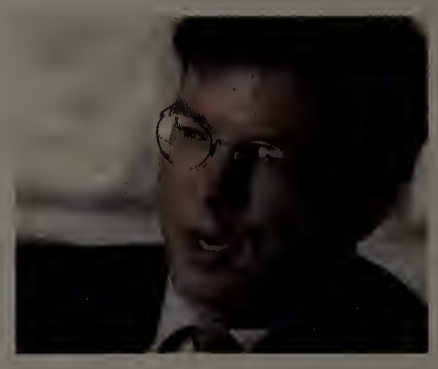
What is the biggest obstacle you face for '98?

The positive way to say that is: The biggest thing to happen in 1998 at Novell is clearly going to be the success of NetWare 5.0. It's in Beta 2 now. We have shipped a record 65,000 CDs. We are planning to ship in final beta something like 110,000 CDs next month.

The initial reviews have been quite positive. The basic TCP/IP architecture is very stable and from there we can grow.

Are you expecting to increase your installed base with NetWare 5.0?

Of course. We are increasing our installed base now. There is this conventional wisdom that new sales are going to NT. But that is false. We share the network with Microsoft in the sense that people deploy NT as application servers and they deploy NetWare as network services servers.



We think that model will continue forever. We don't think one or the other will dominate.

Why will that model continue forever? What is your argument for choosing NetWare 5.0 over NT?

The technical answer is that our architecture gives us between a factor of two and a factor of 10 better performance over any of our competitors. There is this confusion that all operating systems are the same. They're not.

Well, that is today. What about the long-term competitive advantage?

In most markets there are specialists who do stuff that is very specialized, and they do it much better than the general-purpose suppliers. We are the specialists. We are going to become even better at being special. If anything, the performance gap between NetWare and NT is going to get bigger.

NT 5.0 has 32 million lines of code. It has everything including the kitchen sink in it. [With NT, Microsoft is] busy trying to compete with Sun Solaris, which is a very, very broad-scale platform. From my perspective, that creates a perpetual opportunity for Novell to find highly specialized things and do them all well.

How will you navigate the roll-out of NetWare 5.0 so that you don't kill sales of NetWare 4.X before sales of 5.0 ramp up?

We have the inverse problem. We have a problem getting our base to move. They are either very happy, very slow moving or both. The question we face is, how can we get customers to move to NetWare 5.0? We will obviously sell NetWare 5.0 into new installations. But with existing customers, the upgrade cycle takes time.

Given that you want to move people quickly to NetWare 5.0, are you going to be doing anything along the line of price incentives?

We have not made those pricing decisions yet. It is not clear to me [that price is] a big issue right now. All the data says that people are waiting patiently for products that we promised more than a year ago. The fact is that our customers are really quite loyal. They believe in the vision, they are waiting, and they want these products. So I don't currently anticipate any unusual calisthenics over the price.

Will you be more vocal against Microsoft?

Often when people talk about marketing, they are talking about the feeling of domination. I have asked people how we could pick up the perception of being more dominant. I was told to become more like Bill Gates. That's not in the cards.

So we have to define some realistic objectives. We are going to aggressively tout the [areas] where we are better than anybody else and we are going to own [those areas]. We need to define what we do best. We don't want our competitors to define us.

What is the excitement at BrainShare going to center on this year?

It's going to be a continuation of what we have been doing for a year now. You are going to see a tremendous bloom in products over the next couple of months, which we think will reinvigorate the perception that people have regarding where we're going.

The next set of things has to do with partnerships and product bundles, both among our own products and third-party products, and a lot more Java claims.

On the subject of Java: NetWare 5.0 will be fully Java enabled, but why should a customer buy Version 5.0 to run Java applications when the customer can also run the applications on other proven platforms such as NT, Unix or IBM's AS/400?

Just because everybody has licensed Java doesn't mean that the Javas are all the same from the standpoint of scalability and performance.

At the moment, for example, Microsoft claims that they have the highest performing [Java virtual machine] on the client. In our case, we believe that we will have one of the best, if not *the* best, performing server-side Java implementations. We don't do clients, so we are not involved, and we are staying furiously neutral on the current client shenanigans. ■

Novell CFO calls it quits

Novell, Inc.'s senior vice president and chief financial officer has resigned, and the company already has named an interim replacement.

Having held the Novell CFO job for the past nine years, James Tolonen now will be taking time out to consider his next career move, according to the company. However, he will stay with Novell until April 30, when the company's second financial quarter for fiscal 1998 ends.

Tolonen joined Novell in 1989 when the company acquired Excelan, Inc., where Tolonen also held the CFO position.

Joining Novell as interim CFO is Dennis Raney, most recently employed by QAD, Inc. Raney also has worked as CFO at General Magic, Inc. and California Microwave. Prior to these appointments, Raney put in 24 years at Hewlett-Packard Co.

With Raney in place as interim CFO, Novell will continue its efforts to recruit a chief operating officer, according to CEO Eric Schmidt. The COO position has been vacant since last June when Joe Marengi, Novell's then-president and COO, left the company.

Novell's most recent financial results saw the company perform better than analysts had expected, with the software vendor reporting a profit of $14 million and revenue of $252 million for the quarter ended Jan. 31.

— Clare Haney, IDG News Service

Bay Networks warns of revenue shortfall

By Elinor Mills
Santa Clara, Calif.

Bay Networks, Inc. last week warned that its third-quarter revenue and profit will fall off significantly from its second-quarter results, in light of weaker-than-anticipated product demand.

The network equipment firm, which has been on the comeback trail since David House took over as CEO in 1996, anticipates revenue for its 1998 third fiscal quarter ending March 28 will fall 10% from the $645 million in revenue for the second quarter. But the company still expects revenue for the quarter to top the $513 million in revenue recorded in the third quarter last year.

Bay said it expects to take a charge against earnings of $154 million related to its acquisitions of New Oak Communications, Inc. and Netsation Corp., both completed during the quarter.

Mills is a correspondent with IDG News Service's San Francisco bureau.

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Briefs

■ **Ascend Communications, Inc.** *this week will announce* **Pipeline 10,** *a Type II PC Card card for laptops that includes a 56K bit/sec modem and an ISDN terminal adapter. Initially, Pipeline 10 will be equipped with a K56flex 56K bit/sec modem, but a free upgrade to the 56K V.90 standard will be available for download when the standard is set. Pipeline 10 only offers support for Windows 95, 98, NT 4.0 and NT 5.0 operating systems. It is shipping now and costs $550.*

Ascend's Pipeline 10 *features a modem and ISDN for laptops.*

© Ascend: (510) 769-6001

■ **NetScout Systems, Inc.** *last week said its* **LAN monitoring** *and analysis software can view virtual LAN traffic within and between Cisco Systems, Inc. switches.*

NetScout Manager Plus Version 5.2 enables users to direct a Cisco Catalyst switch to mirror all local VLAN traffic to an attached NetScout Probe. This allows users to view up to 19 Remote Monitoring 2 statistical groups on VLAN member ports within a Catalyst switch, NetScout said.

NetScout Manager Plus 5.2 is shipping now. It costs $5,995 for Windows 95 and NT, and $8,995 for Unix.

© NetScout: (978) 614-4000

■ **Cisco Systems, Inc.** *last week announced it is partnering with* **Ganymede Software, Inc.** *to enhance its customer simulation and* **testing services.** *Cisco will license Ganymede's Network Performance Endpoint (NPE) product, which simulates data traffic on a LAN and gives users performance benchmarks. NPE will be used to interface with Cisco's Internetworking Operating System.*

© Ganymede: (919) 469-0997

INS targets net performance management

Version 5.0 of EnterprisePRO enhances server performance monitoring, problem reporting and fault isolation.

By Jim Duffy
Sunnyvale, Calif.

International Network Services (INS) last week unveiled enhancements to its network management service software that let users quickly spot network performance problems.

Version 5.0 of INS' EnterprisePRO offering features enhanced alarm notification and server performance monitoring capabilities. It also includes enhanced data reporting and report writing, fault isolation and support for Bay Networks, Inc. proprietary management information.

INS already supports Cisco Systems, Inc. and 3Com Corp. management information, a company spokesman said.

INS provides enterprises with network planning, design, implementation, operations and optimization services. The company also provides software and electronic services for repetitive network management tasks, such as monitoring and reporting.

INS' key offering in this area is EnterprisePRO. EnterprisePRO is a Web-based monitoring and reporting tool for clients of INS' network management service. It lets users view, through a Web browser, performance data collected by agents on IP devices and stored on a Web server.

Users also can view EnterprisePRO data through a Hewlett-Packard Co. OpenView interface.

Version 5.0 includes multithreaded polling and dynamic database updating features that notify network managers of performance threshold breaches in real time.

Version 5.0 also provides more detailed performance management reporting and analysis for Windows NT, Unix and Novell, Inc. servers than previous version of EnterprisePRO.

Timely information

Users can now obtain up-to-the-minute CPU load, memory utilization and disk space utilization data on a device, departmental or overall corporate level, INS said. Customers can use this data to develop and verify internal and carrier service-level agreements, the company said.

Features of EnterprisePRO 5.0

- Real-time notification
- Server performance monitoring
- Up-to-the-minute reports
- Data drill down capabilities
- Custom report-writing capabilities
- Enhanced configuration management capabilities
- Support for Bay Networks' proprietary MIBs

Software developer Intuit, Inc. currently uses EnterprisePRO to monitor network utilization for capacity planning, error conditions and to compare frame relay circuit utilization with committed information rates, said Rick Parkinson, network manager at Intuit. He expects to have Version 5.0 up and running later this month.

"Those [new features] are some of the things we've been asking INS for," Parkinson said of EnterprisePRO 5.0.

In addition to the notification and server monitoring enhancements, EnterprisePRO 5.0 delivers real-time performance data reporting at the click of a mouse so users can proactively track quality of service across network and server devices.

Users can establish multiple levels of reports to get more detailed device performance data. This helps accelerate problem resolution, INS said.

The software also lets users create custom device profiles for specific reports on groups of devices or exception conditions.

For more immediate access to device configuration data, EnterprisePRO 5.0 provides customized configuration capabilities through an administration database and device directory modification.

MIB support

Lastly, EnterprisePRO 5.0 supports Bay's proprietary Multiline Management Information Base (MIB).

Multiline is a technology that enables users of Bay equipment to group multiple 100M bit/sec Fast Ethernet links into a single, logical high-bandwidth pipe.

Support for the Multiline MIB will let users collect statistics for Multiline logical links. This will reduce calculation time and provide more concise statistical reporting, as opposed to collecting statistics on individual physical links, INS said.

EnterprisePRO 5.0 is available now for INS' EnterprisePRO management service clients at no additional cost.

✆ INS: (888) 467-8100

Cisco assures it will deliver policy-based nets

By Jim Duffy

Cisco Systems, Inc. recently announced CiscoAssure, a software product line designed to administer and enforce network access and quality-of-service (QoS) policies.

CiscoAssure includes four products:

- A graphical user interface for policy administration
- A policy server for storing and downloading policies to network devices
- An enhanced version of Cisco's DNS/DHCP Manager server, which binds network names and addresses to specific policies
- Dynamic application recognition logic for firewalls, routers and LAN switches, which dynamically allocates QoS policies on a per-application basis

Cisco will roll out these products by year-end. The company did not disclose pricing.

Cisco last year announced policy initiatives for network management and security (*NW,* March 17, 1997, page 17; Oct. 6, 1997, page 30).

"But it's still not clear at this point how and when [integration of the disparate policy initiatives] is going to happen."

— John McConnell, president, McConnell Consulting

Though Cisco is now shipping two policy-based security servers, analysts say the onus is on Cisco to deliver CiscoAssure products and demonstrate proven implementations to back up its ambitions.

"It's really hard to argue with a 30,000-foot view," said John McConnell, president of McConnell Consulting, Inc., in Boulder, Colo.

"But it's still not clear at this point how and when [integration of the disparate policy initiatives] is going to happen," McConnell said.

Cisco's policy initiative mirrors that of 3Com Corp.'s Transcend Policy Manager plan (*NW,* Feb. 16, page 10) and the directory-based, "application-aware" network strategy of start-up Berkeley Networks, Inc. (*NW,* Jan 12, page 14).

CiscoAssure is a key component of Cisco's Directory Enabled Networking initiative, which it started with Microsoft Corp. last fall. For communicating between directories, Cisco plans to use Version 3 of the Lightweight Directory Access Protocol.

To fill out CiscoAssure, Cisco next year plans to add:

- Security policy
- Video and voice scheduling
- Microsoft's Active Directory

✆ Cisco: (408) 526-4000

INTERNETWORKING MONITOR

Fanning frame size debate flames

If you are not aware of the frame size fracas, you're missing a good fight. Debating the benefits of large frame sizes for fast frame networks is getting a lot of industry attention of late.

Frame size is an issue that not only pits token-ring vendors against Ethernet vendors, but also Ethernet vendors against one another. Performance, efficiency and backward-compatibility are the main arguing points in the discussions to date.

I've already gone on record about the benefits of large frames with token ring. More recently, prominent Gigabit Ethernet vendors have squared off on the subject. The recent Network World Fusion face-off between Alteon Networks' Selina Lo and Packet Engines' Bernard Daines is a classic exercise in obfuscation and illumination. Although the year is young, Daines' opening salvo in his "Jumbo Frames? No!" argument gets my vote for the year's finest example of elegant techno-gibberish. He dismisses the performance benefits of Jumbo Frames using a specious argument based on "header-to-data" efficiency. Comparing the header-to-data ratio of 1,538-byte frames to that of 9,038-byte frames, he calculates the efficiency of the former to be 97.5% compared with the latter's 99.6%.

He writes, "The difference in time required to send a 1M[-byte] file is only 0.1 msec." To him, this is proof that performance benefits of large frames are close to nonexistent. Were his logic correct, his conclusion might be correct. But that is not the case. His premise is that in both scenarios, the typical 1M-byte file is streaming across the net at wire speed. And there's the problem with his argument.

Kevin Tolly

To assume wire speed as the starting point is to miss the point. It is the pursuit of wire-speed application throughput that causes us to consider large frame sizes. Just because frame generators can drive Fast Gigabit Ethernet at wire speed doesn't mean real applications can.

It is only with the reduced packet handling and the more efficient data pipelining made possible by Jumbo Frames that we can approach this level of efficiency. The best way to view 1,500-byte vs. 9,000-byte frames is to consider how many of each size frame it takes to fill a Gigabit Ethernet pipe. It takes over 80,000 frame/sec of the former but only around 14,000 frame/sec of the latter. That's a dramatic difference in workload and performance.

Lo repeats her oft-heard but ever-true argument: Jumbo Frames can deliver a 50% increase in throughput with a simultaneous 50% decrease in CPU utilization.

Improved performance is no red herring — it is the central issue. And while there are downsides to Ethernet adopting a larger frame size — primarily backward-compatibility — the performance benefits are likely to convince many network managers to seriously consider its merits.

Tolly is president of The Tolly Group, a strategic consulting and independent testing firm in Manasquan, N.J. He can be reached at (732) 528-3300, ktolly@tolly.com or www.tolly.com.

Get more online:

- The face-off between Packet Engines' Bernard Daines and Alteon's Selina Lo, plus reader input
- Position papers from both sides

FREE SEMINAR

Planning for High Speed Token Ring

Without question, the introduction of High Speed Token Ring is the most significant development for Token Ring customers in a decade. This advancement revitalizes Token Ring as a strategic technology on a par with ATM and Gigabit Ethernet. In fact, the unique architectural characteristics of Token Ring will likely make it more effective than Ethernet at speeds of 100Mbit/s, 1 Gigabit, and higher. And, the entire industry is united behind a single IEEE standard for High Speed Token Ring.

Now that the industry's leading networking providers have announced they will ship High Speed Token Ring products later this year, users need to make plans for the implementation of this turbo charged upgrade to their existing Token Ring nets. Large frame sizes, native prioritization, and multiple active paths between switches are among the key attributes that Token Ring brings to the table. Token Ring users can now plan to scale their networks up to 100 Mbit/s and Gigabit speeds without sacrificing these attributes.

Join industry gurus Kevin Tolly, president of The Tolly Group and John Gallant, Editor in Chief of *Network World* in a unique interactive event that will examine High Speed Token Ring and the issues surrounding this exciting new LAN technology. Plan now to attend this FREE SEMINAR and learn how High Speed Token Ring can boost your network bandwidth.

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- Learn how High Speed Token Ring and ATM compliment each other in the Enterprise.
- Learn how unique architectural characteristics of Token Ring provide tangible benefits when scaling to gigabit speeds.

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8:00 – 9:00	Registration & Continental Breakfast
9:00 – 9:30	SEGMENT 1 • **Level Set**
9:30 – 10:30	SEGMENT 2 • **The Decision Drivers**
10:30 – 11:00	Break & Product Information
11:00 – 12:15	SEGMENT 3 • **High Speed Token Ring Strategies**
12:15 – 1:30	Complimentary Lunch
1:30 – 3:00	SEGMENT 4 • **Technical Issues and Options**
3:00 – 3:15	Break & Product Information
3:15 – 4:00	SEGMENT 5 • **The Future**

with Kevin Tolly

THE TOLLY GROUP

KEVIN TOLLY is President and CEO of The Tolly Group, a strategic consulting, independent testing, and industry analysis organization. He is a leading industry consultant and is responsible for guiding the technology decisions of major vendor and end-user organizations. Tolly writes regularly for *Network World*, and other publications and has been widely quoted in leading business publications such as *Business Week*.

and John Gallant

NetworkWorld

JOHN GALLANT is Editor in Chief of *Network World*, one of the fastest growing publications in the computer/communications industry. With more than 13 years experience covering the industry, Gallant sets the strategic directions for the newsweekly, which serves over 157,000 network IS managers. As senior vice president, Gallant also guides Network World Publishing, Inc's (NWPI) other editorial ventures including *IntraNet*, a magazine focusing on how corporations are using Internet technologies.

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Briefs

■ **Citibank Corp.** *has awarded a five-year,* **$750 million contract** *to AT&T Solutions, the telecom giant's outsourcing arm. AT&T Solutions' task will be to unify Citibank's 11 data networks, many of them running older protocols such as X.25 onto a single router-based IP network.*

■ *Raising the regulatory pressure on* **Internet service providers** *a little more, Sens. John Rockefeller IV (D-W. Va.) and Olympia Snowe (R-Maine) have written to Federal Communications Commission Chairman William Kennard, formally asking him to make ISPs* **pay access charges** *to support universal service.*

FCC's *Kennard*

Rockefeller and Snowe said they're worried that there's not enough money available to support new FCC-mandated universal service subsidies for telemedicine and schools. ISPs currently do not pay into universal service, which is supported primarily by per-minute access charges levied on long-distance carriers.

■ **Netcom** *On-Line Communication Services, Inc. is teaming with 3Com Corp. and Netopia, Inc. to offer its customers* **ISDN-based Internet access** *services. Netcom's Netcomplete ISDN services will come bundled with 3Com's Office Connect LAN Modem or the Netopia Router for ISDN.*

The Netcomplete ISDN 100 package includes 100 hours of ISDN Internet access and two e-mail accounts. It costs $49.95 per month with an initial setup fee of $50.

Netcomplete ISDN 200 includes 200 hours of ISDN Internet access and five e-mail accounts. It is available for $89.95 per month with an initial setup fee of $100.

Lucent Technologies makes IP product splash

New access concentrators, telephony options added to company's menu.

By David Rohde
Murray Hill, N.J.

In rapid-fire fashion, Lucent Technologies, Inc. has unveiled three new IP-based products that move data and voice traffic onto packet networks and away from traditional circuit-switched dial-up connections.

Lucent last week announced PortMaster 4, the first new product from its recent purchase of Livingston Enterprises, Inc., a vendor of remote access concentrators. Lucent also has announced a new remote access product for mobile workers who want to use their PCs or laptops as multimedia devices. Additionally, the company introduced IP trunking on its flagship Definity PBX family of products.

The new mobile-worker package, called Virtual Telephone, lets remote users access e-mail, respond to voice mail and make real-time phone calls with PBX features, all using one logon over a single access line.

Virtual Telephone consists of server software co-residing on Lucent's Internet Telephony Server for Enterprises (ITS-E) or, eventually, on a stand-alone Virtual Telephone server running Windows NT. Rounding out the package is client software for headset-equipped PCs running Microsoft Corp.'s NetMeeting 2.1 collaboration application.

Once logged on to the server, a user can point and click to make outbound calls using a Lightweight Directory Access Protocol-compliant corporate directory. The user can also receive incoming calls via multiple H.323 call appearances on the PC screen because NetMeeting supports that standard for IP multimedia sessions. The Virtual Telephone package also has the effect of turning Lucent's ITS-E into a remote access server for e-mail or other LAN applications.

Kathy Meier, Lucent's general manager for Internet communications, said the company built in features that let Virtual Telephone remote users make the same decisions about calls that they could make in the office. For example, users can activate call screening and filtering features in the client software, she said.

Virtual Telephone will be available in July. Lucent did not reveal the price but is touting it heavily as an adjunct to the ITS-E, offering the first eight ports on the Virtual Telephone server free to ITS-E users.

On a larger scale, the new PortMaster 4 is Lucent's first IP-based, high-capacity multiservice access concentrator and router. The PortMaster 4 is aimed at Internet service providers, traditional carriers looking to split out their Internet traffic, and large corporations or institutions concentrating their own IP traffic from hundreds of remote users.

PortMaster 4 eliminates the need for enterprises or service providers to establish separate ports for analog or digital dial-up traffic, said Marty Likier, product marketing manager for Lucent's Remote Access Business Unit, the successor to Livingston Enterprises. PortMaster 4 also eliminates the need for separate phone numbers for different types of remote access. When a call comes in, the system intelligently determines the type of access — such as 56K bit/sec modem, ISDN or dedicated access line — and switches service on that port to accommodate it, Likier explained.

PortMaster 4 supports up to 864 simultaneous connections in a single 10-slot chassis. Available in the second quarter, PortMaster 4 lists for $519 per port.

✆ Lucent: (800) 247-7000

What you need to make off-site PC calls

Client requirements for Lucent's new Virtual Telephone:

- Full-duplex sound card
- Microsoft NetMeeting 2.1
- 33.6K bit/sec or higher modem (or network interface card if directly LAN-attached)
- High-quality headset preferred

Plus a choice of:

- Intel 80486/66-MHz with 8M-byte memory PC running Windows 95, or Intel 80486/66-MHz with 16M-byte memory PC running Windows NT 4.0

Server software runs on Windows NT or Lucent's Internet Telephony Server.

GTE and AT&T WorldNet add IP faxing services

By Denise Pappalardo

GTE Corp. and AT&T WorldNet earlier this month unveiled new IP fax services that will offer users the convenience of sending and receiving faxes from their desktops.

GTE has introduced its GTE DestinationFax service, and AT&T rolled out its WorldNet Enhanced Fax Service. Both let users more easily manage faxing with simple per-page pricing.

AT&T WorldNet's Earley *touts the benefits of IP faxing.*

While the services are not expensive, they are not expected to offer users huge cost savings over traditional faxing.

GTE is charging 12 cents per page, and AT&T is charging 19 cents per page domestically. Those prices aren't bad, but many large business customers can get rates of 7 to 10 cents per minute from their long-distance providers, said Maury Kauffman, managing partner of Kauffman Group, a Cherry Hill, N.J.-based consulting firm.

Users will not be adopting these services based on their costs, but for the ability to send and receive faxes from the road as an add-on feature to their existing Internet access services, Kauffman said.

GTE started a service trial earlier this month, said Greg Lensch, program manager of enhanced IP services at GTE. The trial is expected to extend through June. The service is slated for availability in the third quarter.

AT&T WorldNet also announced its version of an IP fax service, but AT&T is using its existing messaging network to roll out its service. By linking its proprietary messaging network with its IP backbone, AT&T is offering customers a 99.5% network availability guarantee for its service. Users will be able to send broadcast faxes and receive detailed delivery and nondelivery reports.

AT&T's WorldNet Enhanced Fax Service supports up to 250 file formats. With this feature users can print incoming e-mails with attachments even if their PCs do not support the attachments' source application. Users simply send those e-mails to their fax machines where the attachments are printed out, said Kathleen Earley, vice president of AT&T's Network Commerce Services.

WorldNet Enhanced Fax Service is slated for availability by the second quarter and will cost $49.95 per month in addition to a 19-cent-per-page charge and a one-time setup fee of $595.

✆ GTE: (800) 927-3000; AT&T: (800) 242-6005

EYE ON THE CARRIERS

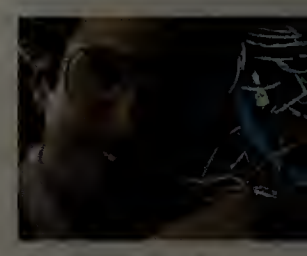
Qwest's local-loop dilemma

Remember Anne Bingaman? Bill Gates sure does. Bingaman is the former U.S. assistant attorney general who brought in the 1995 consent decree against Microsoft's marketing practices. That's the action that stands behind the government's accusations that Microsoft improperly bundles Windows 95 and Internet Explorer. Now through the magic of industry upheaval, Bingaman stands to play another major role in networking — as a key official at Qwest Communications International.

With its massive new OC-192 speed national network, Qwest is looking to take boatloads of enterprise business away from the big, entrenched carriers. Two years ago, Qwest's new merger partner, long-distance carrier LCI International, hired Bingaman to head its local division. The idea was to use Bingaman's influence and experience in industry and government circles to build LCI's local-exchange business. Voila! Now Bingaman stands in a position to complete the local loop between you and Qwest.

Perhaps you're thinking to yourself: "Gee, LCI . . . I've heard of it as a long-distance company, and I've seen LCI's TV commercials promoting exact billing for residential telephony, but it has never knocked on my door as a competitive local exchange carrier."

Well, there's the rub. LCI owns only one local telephone switch. Instead of building its own local networks, LCI has attempted to resell lines from regional Bell operating companies. And like everyone else who tries this, Bingaman concedes that local resale is very tough sledding. In fact, LCI has really pursued the local market on the legal front.



David Rohde

Bingaman has filed petitions asking the Federal Communications Commission to go beyond even its current, controversial interconnection rules to establish performance criteria for RBOCs' electronic order-sharing systems. Bingaman also recently asked regulators to provide a mechanism to split the RBOCs into wholesale and retail companies to avoid conflicts of interest.

Protesting against the notion that LCI is pursuing a legal-only local strategy, Bingaman recently told me that LCI network engineers are examining options for a facilities-based entry. But she and LCI Chairman and CEO Brian Thompson reiterated that LCI is unwilling to post large local-network losses the way MCI has. "There's a lot that has to be sorted out before we jump in," Thompson said.

Indeed there is, but isn't it remarkable how the race seems to be going to those — such as WorldCom CEO Bernie Ebbers and Qwest's own president, former AT&T exec Joe Nacchio — who aren't waiting to sort things out? Qwest's entire business is based on owning its facilities, not lobbying the government for a good price to lease someone else's. Even if Bingaman wins her policy wars, it's going to take at least another year. Then the inevitable RBOC lawsuits will delay things even more.

It would be neat to be in the room when Nacchio, Thompson and Bingaman decide whether the new Qwest will be a real local carrier after all. If I were there, I'd remind them that someone else with an end-to-end story is out there signing up a dozen of their prospects to long-term contracts. Maybe then they'll decide what Nacchio already knows: Users buy bandwidth, not telecom policy.

Rohde is Network World*'s senior editor of Carriers & ISPs. He can be reached at david_rohde@nww.com.*

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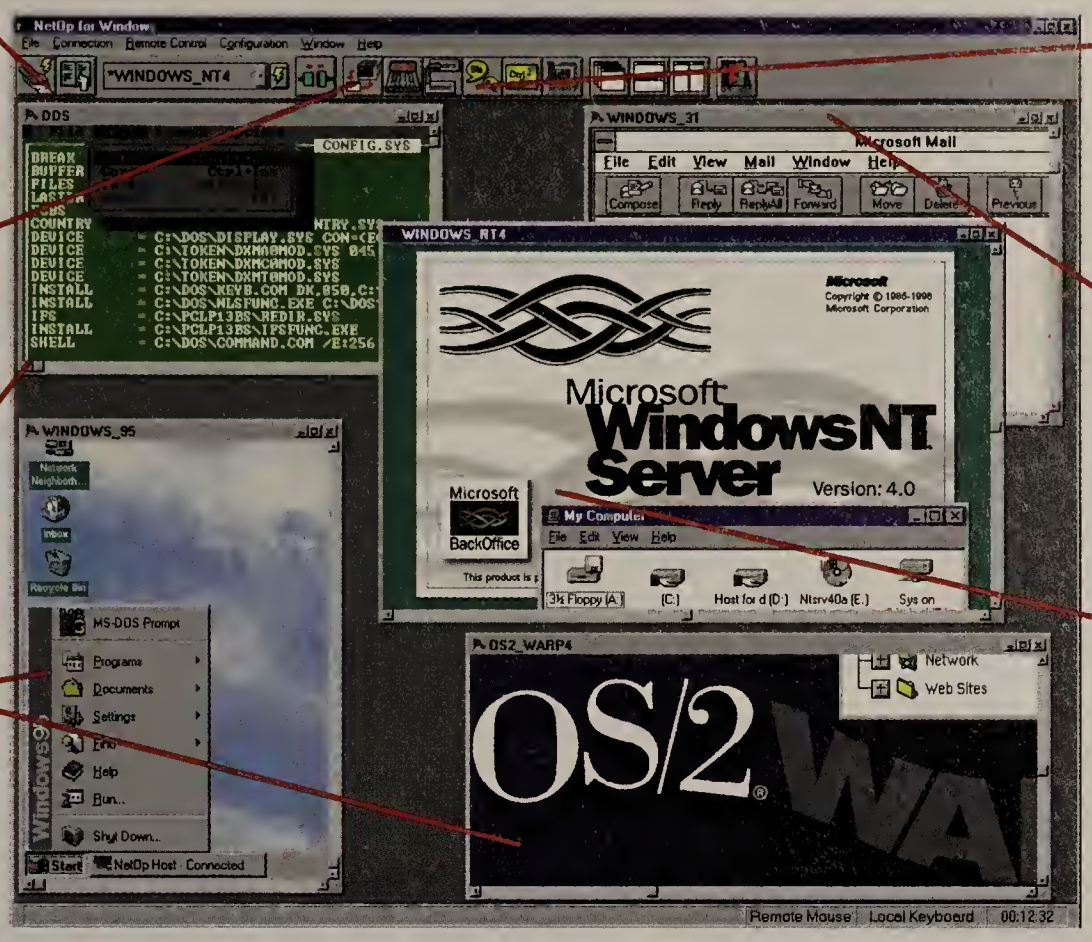

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Briefs

■ *San Francisco-based start-up* **Moai Technologies, Inc.** *last week began shipping LiveExchange, a* **business-to-business electronic commerce application** *that companies can use to auction off excess product inventory to wholesale buyers over the World Wide Web.*

Moai CEO Anne Perlman said LiveExchange, available in Windows NT and Solaris versions, starts at $100,000 per server.

© Moai: (415) 490-5551

■ *Internet messaging vendor* **Innosoft International, Inc.,** *of West Covina, Calif., last week acquired* **Critical Angle, Inc.,** *an Austin, Texas, company that specializes in directory services and integration technology. Terms of the deal were not announced.*

Innosoft contends that Critical Angle's work with Lightweight Directory Access Protocol (LDAP) 3.0 will bolster Innosoft's standards-based enterprise messaging products. Critical Angle founder and President Mark Wahl was co-chairman of the IETF working group that last December adopted LDAP 3.0.

■ **ICL PLC** *has joined the ranks of object request broker vendors linking* **Microsoft Corp.'s** *Component Object Model (COM) with the Object Management Group's Common Object Request Broker Architecture (CORBA). The British company, owned by Fujitsu, Ltd., of Japan, has launched DAIS Com2Corba, which allows COM Automation clients to access CORBA components anywhere on a network via the Internet Inter-ORB Protocol.*

COM-to-CORBA bridges also are available from Iona Technologies, Ltd. and Visual Edge Software, Ltd.

© ICL: 44-181-788-7272

IBM's TSpaces middleware could be missing link

Java-based software to link small computing devices to each other and backbone networks.

By Marc Songini
San Jose, Calif.

Have you ever wished your electric toothbrush could talk to your mainframe?

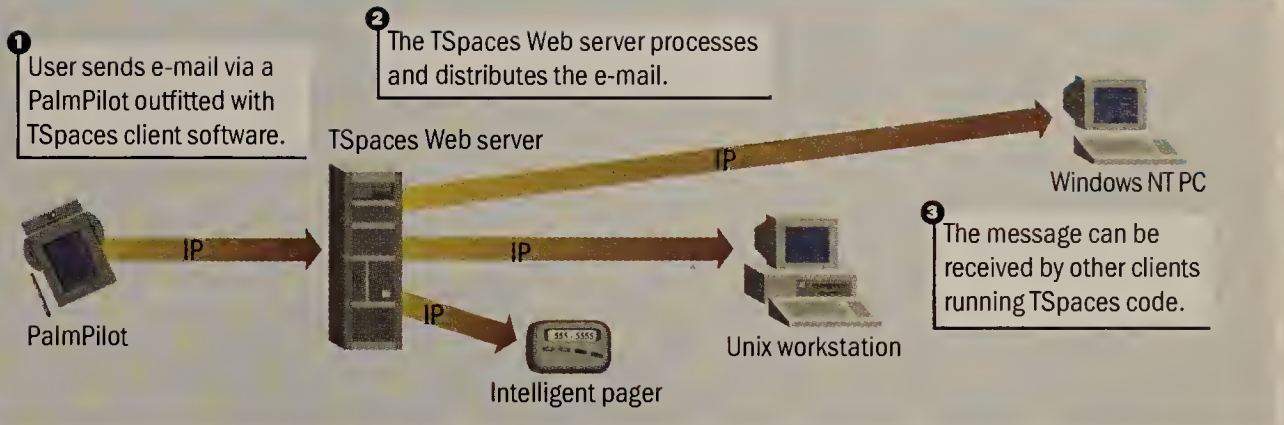
While that may be pushing it, IBM has a slightly less ambitious project — a Java technology called TSpaces that will allow small computing devices to talk to each other or access corporate backbone resources with relative ease.

A test version of TSpaces was posted last Monday on IBM's alphaWorks Web site for developers to play with, and the product will be publicly demonstrated at the JavaOne conference later this month.

There are many small devices currently in use, such as PalmPilots and personal digital assistants, that are begging to be linked to networks, according to IBM. And new devices are on the way, including smart phones, more advanced pagers and the like.

IBM is fond of calling these small products "Tier-0" devices. TSpaces is the middleware that IBM hopes will let Tier-0 devices talk over an IP network.

IBM's TSpaces: Linking disparate networked devices



For example, think of your car as a LAN. According to Tobin Lehman, the IBM Almaden Research Lab staffer heading the TSpaces project, the automobile has 20 embedded computers in it. TSpaces conceivably could set up a link to allow these computers to communicate, share a database and even have varying degrees of security privileges for what they access.

Small devices that users cart around would be no different. "There are over a million PalmPilot users looking for stuff like this," Lehman said.

While aimed at small devices, TSpaces also can link PCs, Unix workstations and various host computers.

The Java-based system is based on a technology called Tuplespaces — hence, TSpaces. Sun Microsystems, Inc. also has an unfinished Java technology based on Tuplespaces called Javaspaces.

How it works

TSpaces has client and server pieces; a bit of code resides on the client, leaving a small footprint, while the server component sits on a Web server. TSpaces software running on a Web server works as "a virtual connecting layer that links all machines and creates a common, consistent platform," Lehman said.

The middleware provides a common data format, database and messaging system that knows how to send the right data to the right source. Select clients that are tuned to receive certain types of messages can pick them up in a TSpaces environment, making TSpaces resemble IP Multicasting.

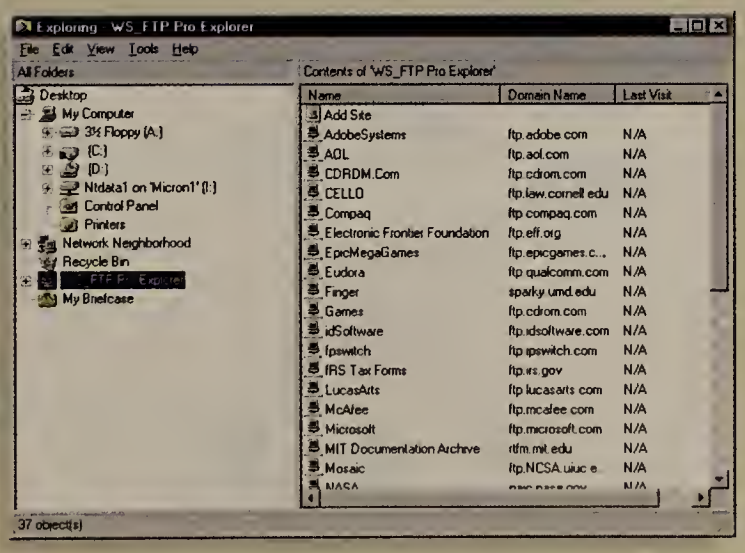
Users with low power and small memory devices too weak to handle bulky SQL-based databases will be able to create lighter databases. Using a simple interface, customers can index and access these data repositories, IBM claimed. While the first iteration of TSpaces will work with only text-based files, the technology will eventually handle voice, video and other rich types of data. Ultimately, the only limit to the size of the files is the program they're written in and the size of the device running them, Lehman claimed.

TSpaces sounds like a good idea to Bill Cason, chief technology officer at PSW Technologies, an Austin, Texas-based software developer and systems integration company. "That would be very powerful," he said. An application that would get these devices communicating with corporate backbones would catch on like Lotus Notes, he added.

IBM declined to divulge pricing or commercial product availability. ■

QUICK TAKE: WS_FTP PRO 5.0

FTP with an Explorer flavor



Ipswitch, Inc. today begins shipping WS_FTP Pro 5.0, a File Transfer Protocol utility that is integrated with Microsoft Corp.'s Windows Explorer file system. The $37.50 package displays FTP sites and related files inside the Explorer file management window.

According to Ipswitch President Roger Greene, FTP is an underutilized protocol that gets at large files faster and more efficiently than browsers or e-mail attachments.

Ipswitch: (781) 676-5700

Get more online:

- **A copy of TSpaces software**
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NET INSIDER

The elusive goal of counting

Once upon a time when the 'Net was young, people thought they knew how big it was — at least from a traffic perspective.

Merit, the organization that managed the NSFnet for the National Science Foundation, used to publish monthly traffic reports. These reports listed the amount of traffic that entered and exited the NSFnet backbone at the exchange points with the regional networks.

The Internet of those days primarily consisted of a set of regional data networks — sort of geographically constrained Internet service providers — serving customers and using the NSFnet to exchange traffic among themselves.

This simple Internet architecture meant that the Merit reports gave a reasonable idea about what was going on. Even then it was hard to use these reports to tell what the pattern of traffic exchange was, since they only listed traffic in and out of the edges of the NSFnet and not what paths this traffic was taking through the backbone.

Those days of a simple Internet are long gone. There is no longer one backbone, but rather a dozen or more, depending on your definition of a backbone. The ISPs no longer are restricted to a specific territory.

There are many ISP-to-ISP connections and these links form a semi-random mesh rather than a clean hierarchy. And the ISPs consider their traffic statistics to be proprietary information.

So we have no real traffic data and even if we did, it would be hard to understand the effect of the traffic patterns. For example, if I were going to send data between two sites on different ISPs in Boston, that data might never have to leave Boston if the two ISPs are interconnected locally.

Scott Bradner

Then again, the traffic might have to go through Washington, D.C. if the ISPs only interconnected at the MAE East Exchange.

That means it is impossible to answer a question that gets asked all the time: What are the relative traffic loads of the Internet and the public telephone network?

Because of Federal Communications Commission reporting rules, there is reasonably good data about what is going on in the phone network, but nothing more than speculation about the Internet side.

There is a new reason to worry about this lack of an ability to understand just what is going on in the Internet. Some fear that the company resulting from the WorldCom/MCI merger proposal would dominate the Internet business.

In the past, MCI has made extravagant claims about the percentage of Internet traffic that flows through its network. These were claims that no one could refute because there was no public data that could be used to analyze the claims. The charges of potential dominance and the defenses of limited dominance are currently only bluster because there is no public data to back them up.

It just might be time to figure out a way to get some real information about what is going on in this infrastructure that every day is becoming more vital to the world's economic health.

Disclaimer: Harvard's claims are real, not extravagant. In any case, I developed the above desire for data on my own.

Bradner is a consultant with Harvard University's University Information Systems. He can be reached at sob@harvard.edu.

Technology Update

Covering: Evolving Technologies and Standards

NUTTER'S NETWORK HELP DESK

Ron Nutter, a Master Certified Novell Engineer and Groupware CNE in the Lexington, Ky., area, tracks down the answers to your questions. Call (800) 622-1108, Ext. 7476, or send your questions to rnutter@world.std.com.

A client of mine is hosting a few small Web sites on an in-house server. To get better connectivity and free up internal resources, my friend wants to mirror that in-house server on my Internet service provider's server. Both servers use the Unix operating system. What software would accomplish this mirroring, and what process options should I be considering?

Via the Internet

Depending on the version of Unix the servers are using, you should be able to handle this task using functions built into the operating system or by adding a little freeware/shareware to the mix.

First, you'll need to examine HTML and other links in the Web pages. You need to make sure that any server-specific entries, such as unique directory names, are the same on both systems. Unless both systems are the same Unix brand and version, you'll probably have to do some tweaking to accommodate differences in how each system handles Common Gateway Interface scripts and supports other functions.

Once this has been done, most of what you want to do can be accomplished using the Unix Cron function and either File Transfer Protocol or Trivial FTP, depending on your preferences and the level of functionality in the FTP programs for your flavor of Unix. The Cron function is used for scheduling the frequency of the file updates between systems.

Finally, you'll need to configure a script for Cron to execute, copying either the entire directory structure used by the Web server or just the directories that have been changed. If your friend is fluent in the Perl scripting language, the entire process could be automated to the point that the date and time stamp on each page is checked to see whether it needs to be copied to the mirror server. This would reduce the time required for file updates and keep the interserver traffic to a minimum.

Building remote access security

By Alex Henthorn

Since 1992, remote access network administration has evolved from completely distributed systems with little centralized administration capability to centralized server-managed systems.

The evolution in remote access management was primarily]due to the invention of the Remote Access Dial-In User Service (RADIUS) protocol by Steve Willens, then CEO of Livingston Enterprises, Inc.

RADIUS created a client/server architecture that enabled the efficient authentication, authorization and session accounting (AAA) data for users of remote access networks.

Before RADIUS, user authentication information was stored on every remote access server (RAS) on the network.

Limitations in RAS memory storage space prevented remote access networks from growing to serve the exploding number of users.

Moreover, the lack of a central point of control created enormous administrative overhead and prevented effective network security because of inconsistencies in the user information stored in distributed RAS equipment.

Standard information

To satisfy the need for more efficient network scaling, the RADIUS standard designated that all AAA information be stored on a central RADIUS security server. All RAS units could then authenticate users and grant them authorization privileges by dynamically accessing a single RADIUS server.

Finally, RADIUS specified a reliable way to collect session accounting records, which could be processed for billing and network analysis.

RADIUS management technology was critical to the rise of dial-up Internet services because it enabled service providers to build the infrastructure to match the exploding customer demand for Internet access.

To promote the adoption of RADIUS as an industry standard, Livingston Enterprises released a publicly available RADIUS server and its source code. Today, RADIUS has achieved status as the worldwide de facto standard and as the Internet Engineering Task Force's proposed standard, RFC 2138.

Since the release of Livingston Enterprises' first-generation RADIUS server, remote access and security vendors have released a second-generation of RADIUS security servers that offer more advanced features such as token-card security support, database storage interfaces and graphical user interfaces.

However, these second-generation RADIUS servers don't provide the high-performance scalability, fault tolerance, policy-based controls and variety of security functions that high-growth service providers need to manage thousands of remote access users.

In the past, most service providers resorted to developing their own RADIUS server enhancements based on the Livingston-supplied source code.

Today, vendors are responding to this need by releasing faster and more sophisticated RADIUS servers with greater fault-tolerance capabilities.

Although they possess a method for growing their remote access infrastructure, commercial remote access service providers in particular have encountered a new technology barrier — the lack of tools to build a profitable business on that remote access infrastructure. Service providers lack business applications that are closely coordinated with the technical elements of their business.

Critical information

RADIUS servers contain critical user information and dial-up session accounting information that can be used for customer billing and network capacity planning. However, the data is stored separately from the applications that perform billing and planning reports.

In most cases, service providers have been forced to use a hodgepodge of hastily developed software tools that convert and migrate RADIUS data into their business applications. Because technical and business data are not truly integrated, such hastily assembled systems rarely deliver what service providers need.

Ultimately, today's nonintegrated remote access management systems impede the accurate bill processing users need to preserve cash flow.

A remote access trend is that Internet service providers and telephone companies are proposing to deliver outsourced remote access services to enterprise corporations.

The RADIUS standard is evolving to handle outsourced remote access by adding the capability to forward authentication requests to a RADIUS server located at the enterprise network.

It also can be used to dynamically configure the virtual private networking tunnels used for transporting outsourced traffic to the enterprise network.

A key to this type of outsourced relationship between service providers and enterprises is the ability to establish service-level agreements (SLA) that define acceptable levels of remote access service delivery.

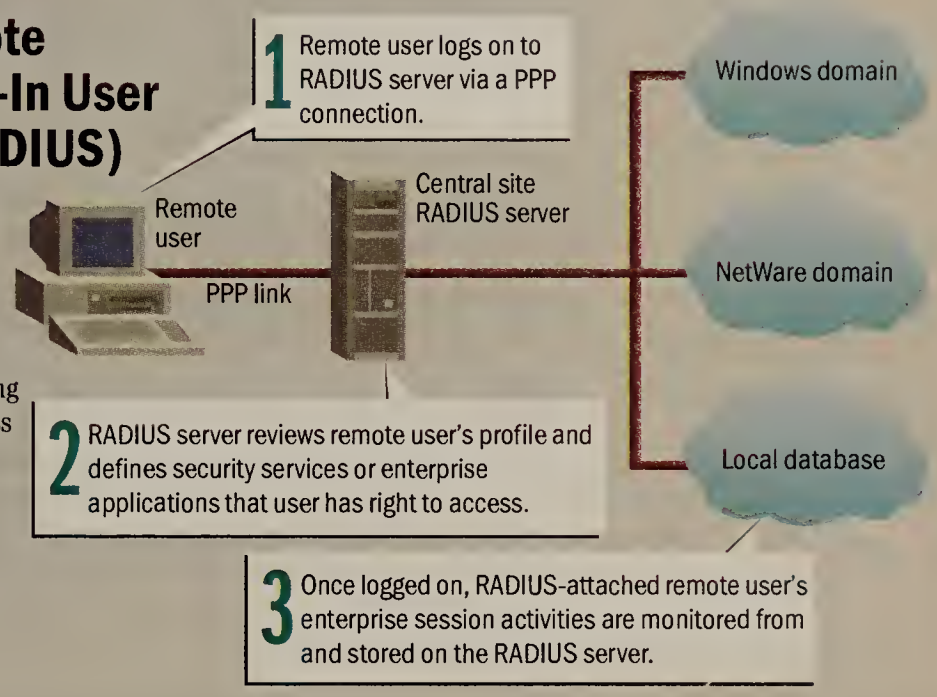
Integrating back-end billing/reporting applications with RADIUS authentication and accounting services will make delivering the statistical management reports needed to prove compliance to SLAs much more feasible.

Henthorn is a senior technical product manager for Lucent Technologies, Inc.'s Remote Access Business Unit. He can be reached at (888) 584-6366.

HOW IT WORKS

Using Remote Access Dial-In User Service (RADIUS)

The RADIUS protocol enables the efficient management of authentication, authorization and session accounting data for remote access networks. Session accounting records can be used for billing and network analysis.



EDITORIAL *insights*

Directories on the brain

With thousands of Novell followers gathering in Salt Lake City this week for the annual BrainShare confab, it seems like a good time to address one area where Novell clearly has a commanding lead over Microsoft: directories.

There's a mounting body of evidence that this directory business is coming to a head. As we reported last week in our "Directories in the Limelight" feature, there's a veritable army of vendors working to tie their respective hardware and software products into directories of some kind. This week, Novell is expected to discuss ZENWorks, its directory-enabled desktop management suite.

More often than not, these directory efforts follow a standards-based approach based on the Lightweight Directory Access Protocol, so you won't necessarily be tied to a given vendor's directory.

Long-term what all this means is you won't need separate directories for your various network operating systems, applications and equipment. From one enterprise directory, you should be able to manage all your network components. That, in turn, amounts to more reliable data, improved staff productivity and lower costs.

Assuming you've installed at least a smattering of Windows NT Servers by now, Microsoft would have you believe you're nuts to attempt such an effort without its Active Directory service, which is due out with NT Server 5.0 late this year or early next.

Novell counters that its NDS for NT obviates the need to wait. The product turns Windows NT domains into Novell Directory Services objects. So from one directory, you can handle NetWare- and NT-related resources.

And guess what? Novell's product works as advertised. The late beta version we tested a few months ago (*NW*, Dec. 1, 1997, page 10) fared well enough to earn our World Class award.

The message here is that there's a huge opportunity for you to reduce your administrative costs and headaches by moving toward a single enterprise directory. But you've got to get a handle on your various business processes and be ready to fight — or referee — internal political battles over who should control what resources.

That means it's important to get the ball rolling. You can start getting your directory act together now using tools from Novell. If you're a Banyan user, StreetTalk for Windows NT will likewise do the trick.

You say you're sick of being hamstrung by Microsoft? This is one time you don't have to be.

Paul Desmond, features editor *pdesmond@nww.com*

Get more online:

- **Last week's feature on directories**
- **Our reviews of NDS for NT and Banyan VINES 7.0**

FIND IT @ NWFUSION.COM 6334

Network Management • Richard Ptak

Focus on making money, not just counting costs

Let's cut out this overwhelming obsession with total cost of ownership (TCO).

By today's best guesses, enterprise desktops cost anywhere from $4,286 to more than $13,000 annually to install, run and maintain. Automated tracking and accounting TCO applications are proliferating as vendors fight to convince you that theirs is the only viable, cost-effective solution. But what's the point of the enormous amount of energy spent and ink spilled attempting to define and refine TCO?

Do you want to concentrate on holding down costs or helping your business succeed? What's more important: The cost of providing and maintaining a more productive operating environment or delivering a product or service customers value enough to buy?

The current focus on TCO represents a negative maintenance policy that threatens to become an end unto itself. While lowering TCO is important, it produces a one-time bump in profitability — actually, only a reduction in expenses. Managing and monitoring costs are important, but these can become a crutch for lazy executives who lack vision for more positive activities. Focusing on TCO doesn't directly add sales revenue or increase market share, or provide a lasting competitive advantage.

Aren't we overlooking the real business intent that should be driving not just IT but the whole enterprise?

Hard as it may be to believe, the major function of organizational IT departments is neither to introduce the latest emerging technology nor simply to manage systems and devices. These tasks represent only the means to what should be the ultimate goal of the enterprise: business success. This is achieved by growing product demand, increasing market share and gaining competitive advantage — all directed toward generating additional revenue.

How do you avoid falling into the TCO trap?

First, make sure IT contributes visibly and directly to improving your organization's competitive position. IT can do this in a number of ways, including lowering the cost of delivering goods by reducing design, manufacturing, ordering or delivery times; improving the product through better design and enhanced functionality; and reducing manufacturing costs by automating processes.

Second, it's important that IT and business managers understand one another's needs and abilities. IT managers and staff have both the interest and ability to comprehend business issues. They need to understand what customers want, why they do or don't purchase products and the barriers to closing sales.

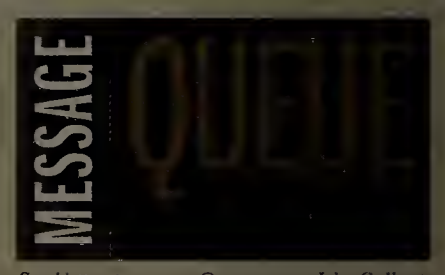
At the same time, business managers must recognize IT's potential for contributing to the organization's success. IT does much more than just provide e-mail and bare-bones computing. It can automate processes, mine customer data for leads and provide worldwide access to the latest information about competitors.

Third, challenge vendors to emphasize how their products can be used to resolve business problems. Only when IT customers focus on the business payoff and demand information about how products can benefit the enterprise will vendors do the research and provide such justification.

A prime example is systems management vendors' current emphasis on end-to-end control of business services and process views. This came about as a direct response to customer demands for platform management information that isn't limited to the status of isolated devices. Enterprise managers will not make multimillion-dollar investments to record the status of a group of routers unless they know downed routers mean millions in lost revenue due to late billing.

A wise man once said, "It is better to achieve good than avoid bad." Moving the emphasis from cost control to business contribution sounds like a much more constructive course of action.

Ptak is vice president of systems management research at D.H. Brown Associates, Inc., an industry research and consulting firm in Port Chester, N.Y. He can be reached at rlptak@dhbrown.com



Send letters to nwnews@nww.com or John Gallant, editor in chief, Network World, *161 Worcester Road, Framingham, MA 01701. Please include phone number and address for verification.*

The frame game

Editor's note: To accompany our "Head-to-Head" on whether the maximum size of Ethernet frames should be increased (Feb. 23, page 45), we set up an online forum on Network World Fusion and asked readers for their views. Here are some of their responses:

A protocol that takes packets larger than 1,520 bytes is not compatible with any existing Ethernet adapters, switches or routers. Such packets can't be switched to existing Ethernet networks — unlike Fast Ethernet and Gigabit Ethernet, which can be switched to 10Base-2.

Feel free to create a new type of physical-layer protocol that supports 9,000-

Netscape's code giveaway won't kill Microsoft

Netscape's proposed giveaway of its Communicator source code is a bold move. However, it is unlikely to stall Microsoft's momentum in the browser wars.

Netscape's gambit is a return to the company's roots in the traditional Internet research and development community, in which free source code is exchanged as casually as the morning's sports section. The radical twist is that Netscape is releasing source code for a mainstream commercial software product.

As you would expect, Netscape will keep close tabs on how licensees deploy its source code. It is building a new internal organization, Mozilla (www.mozilla.org), to publish code, supply technical documentation, operate discussion forums, maintain bug lists and track third-party enhancement projects. Mozilla is not a charitable enterprise, but a strategic effort to leverage the Netscape brand and technology through third-party industry resources.

Netscape just may succeed in its effort to transform its technology into the industry's de facto substrate for browser-based applications. Its offer of potent source code may launch a thousand new products stuffed with Navigator guts. Some Internet service providers will license the Mozilla code for no other reason than to send a signal to Microsoft that they won't kowtow to a monopoly provider. Independent software vendors (ISV) and corporate developers will latch onto Mozilla as a quick and cheap code base for specialized Web, mail, collaboration, push and other client applications. Even my 10-year-old son has vowed to take up C programming in order to craft a kid's browser from Mozilla code.

The Mozilla free source code program's popular acceptance would be good news for enterprises that have standardized on Netscape client software and have watched Microsoft's encroaching market share with mounting dread. Netscape clients would remain ubiquitous and thereby could withstand challenges from Microsoft's Internet Explorer and Active Desktop. Communicator would have a new lease on life and perhaps become a seedbed for innovative third-party browsing and collaboration technologies.

However, Netscape's source code giveaway also could be regarded as an admission of defeat. The company has failed miserably in its attempt to dislodge Microsoft as the be-all provider of desktop applications for network-centric computing. Netscape has watched Microsoft annihilate the market for stand-alone browsers through aggressive pricing and bundling practices. Netscape badly needs to scale down its in-house client development costs to a level commensurate with its direct return on investment — in other words, to some dollar amount approaching zero.

Essentially, Mozilla is a loss leader in Netscape's strategic pursuit of business in the premium markets for intranet servers, development and site management tools, electronic commerce applications and systems integration services. These are extremely competitive markets in which Netscape would be hard pressed to distinguish itself from entrenched competitors such as Microsoft, IBM/Lotus, Novell, Oracle and Sun. One can foresee the day when Netscape, realizing it does not have the resources to duke it out with these powerhouses, seeks out a suitable merger partner.

What's hard to understand is how Netscape — either independently or as a division of a larger firm — could justify maintaining the Mozilla support infrastructure for a product that contributes nothing to the bottom line. Eventually, Mozilla will have to be spun off as a nonprofit advocacy organization that disseminates free, standards-based intranet client code for the explicit purpose of preventing Microsoft from taking over everything.

Microsoft likely will watch Netscape's actions with a mixture of concern and bemusement. Concern because Mozilla, rigorously based on open Internet standards, may weaken ISVs' commitment to Microsoft's proprietary ActiveX and COM+ technologies. Bemusement because Microsoft knows that its own intranet client products can hardly fail because they come strongly integrated — if not bundled — with its near-monopoly operating environments and desktop and server suites.

Barring regulatory intervention, Microsoft almost certainly will not divulge its own client source code to the general public. Instead, it will probably respond by beefing up the API set available for integrating third-party applications with Internet Explorer and Active Desktop. This would be the smart move because few application developers want to muck around in a browser's source code if they can invoke the same functionality with a concise set of high-level programming statements.

But if nothing else, Netscape's source code giveaway will create the market conditions necessary for sustaining a competing browser in a Microsoft-dominated world.

Kobielus, a contributing editor to Network World, *is a senior telecommunications analyst at LCC International, Inc., a McLean, Va.-based network design, engineering and integration firm. He can be reached at (703) 873-2474 or kobielus_james@lcc.com. The opinions expressed are his own.*

byte packets and runs over Category 5 cable; it'll be easy to route between that and Ethernet. But don't call the new protocol Ethernet, because it isn't Ethernet.

Russell Coker
Independent consultant
Melbourne, Australia

The biggest drawback to Jumbo Frames is what happens when conditions degrade on the wire and error rates increase.

When a standard Ethernet packet gets rejected, 1,538 bytes of data, frame and overhead must be retransmitted. With Jumbo Frames, 9,038 bytes of data, frame and overhead must be re-sent.

Let's assume that an application has to move 9,000 bytes of data between two Ethernet nodes. On standard Ethernet, the data would be broken into six frames. Using Jumbo Frames, data would be sent in a single frame.

Let's further assume that midway through the transmission, an error occurs. Using standard Ethernet frames, only 1,500 bytes of data would need to be retransmitted. Using Jumbo Frames, the entire 9,000-byte data set would have to be re-sent.

From a media perspective, yes, Jumbo Frames are more efficient. But it is hardly helpful to the application to have to re-send data sets two, even three, times. As vital as bandwidth and throughput are, the ultimate test of network strength is application performance.

Peter Nayland Kust
Internet/telecommunications analyst
TekMedia Communications Group
The Woodlands, Texas

From a business/market perspective, Jumbo Frames are good — but only if implemented in the correct manner.

Nobody ever likes a new proprietary technology that has value only when implemented enterprisewide. The place for proprietary is when it adds significant value, focuses on a specific type of implementation and is implemented in a safe, controlled manner.

In the case of Alteon's product, Jumbo Frames adds over 2% bandwidth utilization, is focused on server-to-server communications where big frames are a nice feature that will not affect user and server traffic, and is limited to the server farm where back-end proprietary technology does not affect the standardization of the core network (and where network errors are extremely unlikely).

Is this technology vendor-specific? You bet it is. But it is also a good example of value-add. Could there be problems? Absolutely.

Which is why users should approach Jumbo Frames with the same caution they approach any other new technology.

Let the market decide if Jumbo Frames is a valuable technology. My guess is that it will say yes.

Fred McClimans
CEO
Current Analysis, Inc.
Sterling, Va.

Teletoons

Phil Frank and Joe Troise babs@sfgate.com

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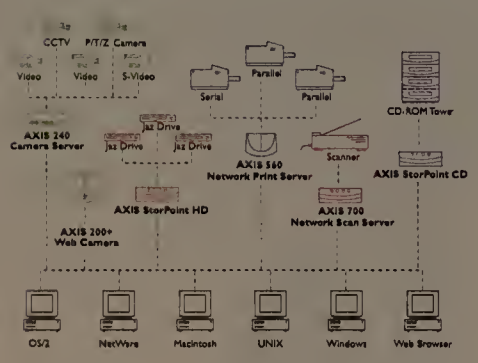

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REMOTE ACCESS SERVERS

Making good connections

Bay's Versalar 5000 Access Switch aces performance tests of enterprise-class remote access hardware.

No doubt about it, enterprise-class remote access servers keep making it easier to get even your most far-flung and demanding users connected. But while the hardware-based products offer high-end features, they don't necessarily offer top-notch performance.

As the Review below shows, some vendors aren't beating on the boxes the way we did in our tests of five leading remote access servers. Only two of the five could support 60 simultaneous file transfers without modification and fine-tuning, and those two didn't have the best performance. That honor went to Bay Networks, Inc.'s Versalar 5000 Access Switch, outfitted with the Versalar 5399 Remote Access Concentrator Module. It clocked in at 35% faster than its nearest competitor, earning it our Blue Ribbon.

Speedy performance doesn't mean much if the server doesn't support all the features you need. Our Issues and Trends story on page 46 will clue you in on high-end capabilities to look for, including virtual private network support, ironclad security, scalability and fault-tolerance.

That story is complemented by the Buyer's Guide Chart on page 48, which makes it easy for you to compare the features and prices of 23 remote access servers. An expanded version of the chart, listing even more features, can be found on Network World Fusion at www.nwfusion.com, along with a search tool that will help you find the server that meets your specs.

By Dean Conant, Victor Renteria, Webb Deneys and Troy Sukert

REVIEW

If the main thing you expect an enterprise-class remote access server (RAS) to do is handle lots of sessions with solid throughput, look no further than Bay Networks, Inc.'s Versalar 5000 Access Switch.

The Versalar 5000, outfitted with the Versalar 5399 Remote Access Concentrator (RAC) Module, topped the field of five entries in our testing, although it wasn't exactly easy sledding. In the early going, the unit dropped calls, and we had to work with the vendor to find a fix. However, once a firmware patch was applied, the unit aced our performance tests, turning in the best throughput numbers. Bay plans to make that patch publicly available by the end of this month, so you shouldn't have any of the problems we experienced.

Compaq Computer Corp.'s Compaq Microcom 6200 Remote Access Concentrator and 3Com Corp.'s Total Control HiPer Access System/EdgeServer Pro Module came in a reasonably close second and third in the performance race, respectively. They were the only two products that didn't drop calls during testing, but their throughput numbers couldn't match Bay's.

The remaining two products — a beta version of Ascend Communications, Inc.'s MAX 6000 and Shiva Corp.'s LanRover Access Switch — dropped calls. Ascend's unit couldn't get past 59 simultaneous calls, while Shiva's product turned in the poorest showing of all, handling no more than 22 connections. In working with the vendors, we were unable to fully isolate the problems, although Ascend did pinpoint a likely cause for its failures as we were going to press (see story, page 44). However, throughput numbers for both units were comparable to those for Compaq and 3Com, albeit for fewer clients.

Each vendor was invited to have a technician on hand during testing to answer our questions and help troubleshoot any problems we encountered. That proved to be a problem for Cisco Systems, Inc., a key player in the market. The company said it couldn't free up a technician during the time we were testing and consequently declined to participate. Shiva likewise did not send a technician, but agreed to have its product tested nonetheless and provided support by phone.

Tests were conducted using 60 Windows 95-based PCs, each of which tapped its own 33.6K bit/sec modem to transfer files to and from a Windows NT 4.0-based server via the RAS unit being tested. We could have increased the number of clients in the test by enabling each PC to emulate multiple clients but we thought the use of emulated clients would not give us real-world results.

We had up to 60 PCs all transferring files at once. We did this by starting with a single node transferring files, increasing to two nodes transferring files at once and so on. If no calls were dropped, we ran the test three times and calculated an average throughput figure for uploads and downloads as measured at each client. If calls were dropped, we gave each vendor a chance to diagnose the problem and apply fixes. If the fixes didn't work, we averaged the three best tests from those we had run. Upload rates were higher than download rates, which is a common phenomenon in this type of test.

During testing we had no problem authenticating users with the Challenge Handshake Authentication Protocol (CHAP) and giving each an automatically assigned IP address.

Bay's Versalar 5000 *Access Switch/ Versalar 5399 Remote Access Concentrator Module took the Blue Ribbon for top-ranked throughput and a highly versatile chassis.*

Bay's comeback

It's not often that you see a product make the type of comeback that Bay's did in testing. Initially, we couldn't get the unit past 20 simultaneous calls. In working with the vendor we discovered the unit was holding requests for files in a queue rather than passing them along.

The vendor was aware of this anomaly, but it had difficulty reproducing the problem in the field or in its own facility. Our experience helped Bay technicians pinpoint the cause of the problem and come up with the patch.

Following the upgrade, the product showed near-steady performance from one to 60 clients. Upload throughput averaged 99.1K bit/sec and varied 1.3% at most from one to 60 clients. Download throughput

averaged 67.8K bit/sec but did dip a bit, starting at 71.2K for one client and ending at 62.8K bit/sec for 60.

Like the servers from Compaq and 3Com, Bay's unit is built with Internet service providers, telephone companies and high-end enterprise users in mind. There is a 13-slot chassis that takes 5399 RAC boards as well as other cards, including ones for management and configuration. All the cards in the system are hot-swappable, meaning you don't have to bring the server down to replace a failed part. The chassis also supports three hot-swappable power supplies with an integrated ventilation system.

The front of each 5399 RAC card has LEDs that indicate line and hardware status as well as the number of dial-in ports in use. Currently, the modems on each 5399 RAC support 33.6K bit/sec transmission and both flavors of 56K bit/sec technology, X2 and Kflex. Bay promises to provide a flash upgrade to support the new 56K bit/sec V.90 protocol when that standard is finalized.

The setup for Bay's unit was relatively straightforward via a PC emulating a VT100 terminal. There also is a Windows-based management tool and a Hewlett-Packard Co. OpenView module available but neither was supplied for this review.

The Bay product was the only one we looked at that didn't support a built-in multiple user authentication scheme. Instead, it requires you to use an external server that supports a variety of authentication methods, including ones that tap the NetWare Bindery, Remote Authentication Dial-In User Service, Unix password list or Microsoft NT authentication databases.

However, Bay provides a high level of versatility once you consider that the same chassis used to support remote access can also be used to support other network functions. For instance, the chassis will accept a variety of LAN switching and routing modules, including modules that support virtual LANs. Everything in the chassis, including VLAN configuration, can be managed from a single Bay Optivity network management console.

Net Results

	PROS	CONS
Versalar 5000 Access Switch/5399 Remote Access Concentrator Module *Bay Networks, Inc.* *www.baynetworks.com* *(408) 495-1900* *$24,785 to $284,930*	▲ Top rated throughput ▲ Clear front panel status display for individual channels ▲ Versatile and feature rich ▲ Hot-swappable cards ▲ Highly scalable	▼ Internal authentication limited to single user name and password ▼ Requires external server for more advanced authentication ▼ Needed vendor assistance to overcome problem causing dropped calls ▼ Chassis takes up a lot of space
Compaq Microcom 6200 Remote Access Concentrator *Compaq Computer Corp.* *www.microcom.com* *(800) 822-8224* *$15,000 to $100,000*	▲ Solid throughput and performance ▲ Redundant power supply ▲ Intelligent management of power and cooling systems ▲ Versatile and feature rich ▲ Hot-swappable cards ▲ Highly scalable	▼ Plethora of status LEDs can become distracting ▼ Installation process needs improvement ▼ Chassis requires a lot of space
Total Control HiPer Access System/EdgeServer Pro Module *3Com Corp.* *www.3com.com* *(800) 638-3266* *$22,000 to $180,000*	▲ Supports fully functional Windows NT Server on a board ▲ Can run Windows NT applications such as firewalls and Web proxy servers ▲ Capacity of 336 simultaneous analog calls, surprising for its physical size ▲ Redundant power supply ▲ Hot-swappable cards	▼ Download throughput degraded as more clients became active ▼ No way to properly shut down the integral Windows NT Server before powering down chassis
MAX 6000 *Ascend Communications, Inc.* *www.ascend.com* *(510) 769-6001* *$14,000 to $64,000*	▲ Easy to configure ▲ Feature rich ▲ Clearly labeled cable connection points ▲ Small, compact design	▼ Dropped calls ▼ Cards are not hot-swappable ▼ Chassis is limited to four WAN ports ▼ Single power supply
LanRover Access Switch *Shiva Corp.* *www.shiva.com* *(781) 687-1000* *$10,240 to $50,100*	▲ Easy to install ▲ Front panel LCD makes configuration easy ▲ Small, compact design ▲ Shared dial out	▼ Dropped calls ▼ Limited modularity ▼ Lacks robust feature set ▼ No redundant power supply ▼ Cards are not hot-swappable

Compaq holds all calls

Finishing just behind Bay in our performance tests was the Compaq Microcom 6200 Remote Access Concentrator, which completed its work with no glitches and showed steady throughput. The server averaged 73.2K bit/sec for uploads and 51.3K bit/sec for downloads. Upload throughput remained steady in going from one to 60 clients, while download throughput varied by 6%.

Compaq's server is similar in design to Bay's but slightly larger, with 17 slots and four redundant power supplies. There's also room for a power control module that monitors the environmental status of the chassis and alerts you remotely when there's a problem with any power supply, fan or the chassis' temperature.

The front panel of each of the six Managed Modem Modules in the unit we tested contained more status LEDs than any of the other RAS units, a total of 72, or three per modem.

A nice touch was that each of the two dual-channel Primary Rate Interface boards in the unit we tested had a Cisco 2511 router on the same card. Like Bay's unit, Compaq's server supports hot-swappable cards.

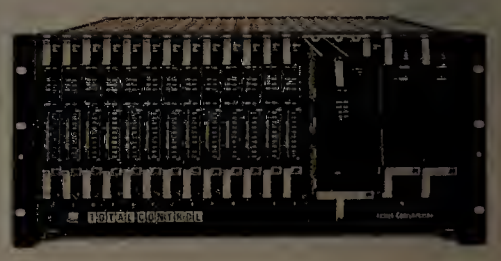
The Compaq Microcom 6200 *Remote Access Concentrator turned in respectable throughput performance.*

However, installation and configuration was quite difficult in comparison with the other products tested. A Java-based Wizard applet running in a Web browser steps you through the configuration, but you're forced to resort to a manual command-line configuration tool if you encounter any problems in the process.

We required a lot of assistance from the on-site technician in configuring this product. Even with company expertise on site, it took five hours to configure the Compaq server, the longest of any that we tested.

Compaq does support its own multiple user Password Authentication Protocol (PAP) and CHAP authentication server, however, giving it an edge over Bay. You can also use external authentication servers, including ones that support RADIUS, TACACS+ and security tokens from Security Dynamics Technologies, Inc.

Compaq matches Bay's versatility by supporting a number of other features in addition to the RAS server. You can throw a mix of modules in the chassis to get a RAS server, router, LAN switch and hub in one box and manage it all from a single console.



3Com's Total Control *HiPer Access System/EdgeServer Pro Module was right on Compaq's heels in upload throughput but fell far behind Compaq on the download side.*

3Com on the performance edge

Performance of the 3Com RAS unit started out on par with Compaq's but took an unexplained dip in download throughput as the number of clients increased. Download throughput started at 51.6K bit/sec and steadily decreased to 35.8K bit/sec by the time it hit 60

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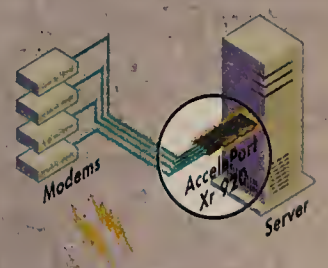

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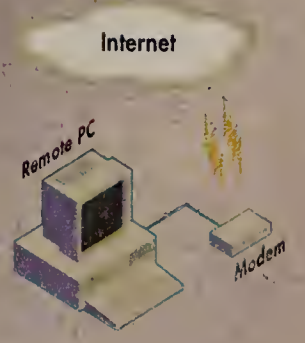

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Score Card

	Performance (40%)	Features (25%)	Managability (20%)	Installation/ configuration (15%)	Total score
Versalar 5000 Access Switch/5399 Remote Access Concentrator Module (Network World Blue Ribbon)	9 x .40 = 3.60	9 x .25 = 2.25	7 x .20 = 1.40	7 x .15 = 1.05	8.30
Total Control HiPer Access System/EdgeServer Pro Module	7 x .40 = 2.80	9 x .25 = 2.25	9 x .20 = 1.80	5 x .15 = 0.75	7.60
Compaq Microcom 6200 Remote Access Concentrator	8 x .40 = 3.20	9 x .25 = 2.25	7 x .20 = 1.40	4 x .15 = 0.60	7.45
Max 6000	6 x .40 = 2.40	8 x .25 = 2.00	7 x .20 = 1.40	7 x .15 = 1.05	6.85
LanRover Access Switch	3 x .40 = 1.20	5 x .25 = 1.25	7 x .20 = 1.40	9 x .15 = 1.35	5.20

Individual category scores are based on a scale of 1–10. **Percentages** are the weight given each category in determining the **total score.**

clients, 27% behind Compaq's download rate for 60 clients. However, the unit's upload throughput was just 1% behind Compaq's.

3Com's 17-slot chassis sports a design that puts its backplane in the middle of the box. 3Com deploys its hot-swappable cards in pairs, with one sliding into the front of a slot and its companion sliding into the rear. The cards in the chassis front have multiple LEDs that provide status information, while those in the rear have ports that accept cable connections. There are also two redundant power supplies and a monster cooling fan tray.

3Com's modem boards support 33.6K bit/sec operation or the company's flavor of 56K bit/sec technology. The 56K bit/sec modems will be flash-upgraded to the new V.90 modem code.

The chassis supports many management options, including the ability to monitor the real-time status of each modem as well as to configure the T-1/PRI lines, modem and network management interface cards. You can also tap into a command line-driven configuration program via a PC emulating an ASCII terminal.

You can use a graphical user interface-based (GUI) tool to configure the product, but it can be a bit of a hassle when you have to set up the unit's IP address. However, if you can hang tough through the GUI-based setup, management and monitoring is a breeze thereafter.

A major differentiator for 3Com is its optional EdgeServer Pro Module, a board that comes preconfigured as a fully functional Windows NT 4.0 Server (Service Pack 3), complete with Microsoft's Remote Access Server software. The NT server can be used to control operations of the chassis while the RAS software can be tapped to handle remote access duties.

Taking up three chassis slots, the EdgeServer Pro Module has a 200-MHz Pentium Pro processor, up to 1G byte of RAM, dual 2G byte EIDE hard drives, a 3 1/2-inch floppy drive, an Ultra-wide SCSI-3 interface and two 10M/100M bit/sec Ethernet ports. It also has a handy LED display that shows the number of current RAS connections and the EdgeServer's CPU utilization.

Creating user accounts on the EdgeServer Pro Module is as easy as adding a new user to an NT server and assigning dial-up access rights.

The EdgeServer Pro Module has a separate network management card with its own Ethernet port, which enables you to feed data to a Windows-based console used to manage the entire chassis. You can also connect a keyboard, monitor and mouse to the EdgeServer Pro Module so you can manage and configure Windows NT Server using that program's utilities.

Not surprisingly, Windows NT RAS handles user authentication if you have the built-in EdgeServer Pro Module. Otherwise, you can use external authentication servers, as with all the RAS servers we reviewed.

Using a built-in Windows NT Server gives you other benefits as well. For instance, you can run any of a number of off-the-shelf firewall, Web proxy server, fax server and thin-client application programs on the same box as your RAS server. This obviates the need to shuttle traffic from your RAS server to a Windows NT Server performing such functions.

A beta version *of Ascend's Max 6000 dropped calls just shy of finishing our test script and may have been hampered by a WAN port clocking problem.*

Ascend maxes out at 59 calls

In many ways, our experience with a late beta release of Ascend's new MAX 6000, an enterprise-class product expected to be available next month, was similar to what we went through with Bay's product. Early in testing, the server started dropping calls.

This just in from Ascend

Ascend Communications, Inc. says it may have isolated what was causing its soon-to-be-released MAX 6000 to perform poorly in our tests. The company says a timing clock on an inactive WAN port was left enabled when it should have been turned off. That could account for the poor showing, especially on download throughput.

The problem occurred after Ascend technicians advised us to move a PRI line from one WAN port to another to rectify initial problems our testers had with the unit dropping calls.

Ascend says leaving clocking enabled on the inactive port threw off the timing on all the other WAN ports, leaving the entire unit with an inaccurate clocking source. The company says it has run tests similar to ours and has gotten twice the download rates we did.

The situation came about early on in Ascend's pre-allotted time in the lab. Each vendor was given a set amount of time to complete tests and troubleshoot any problems encountered during testing.

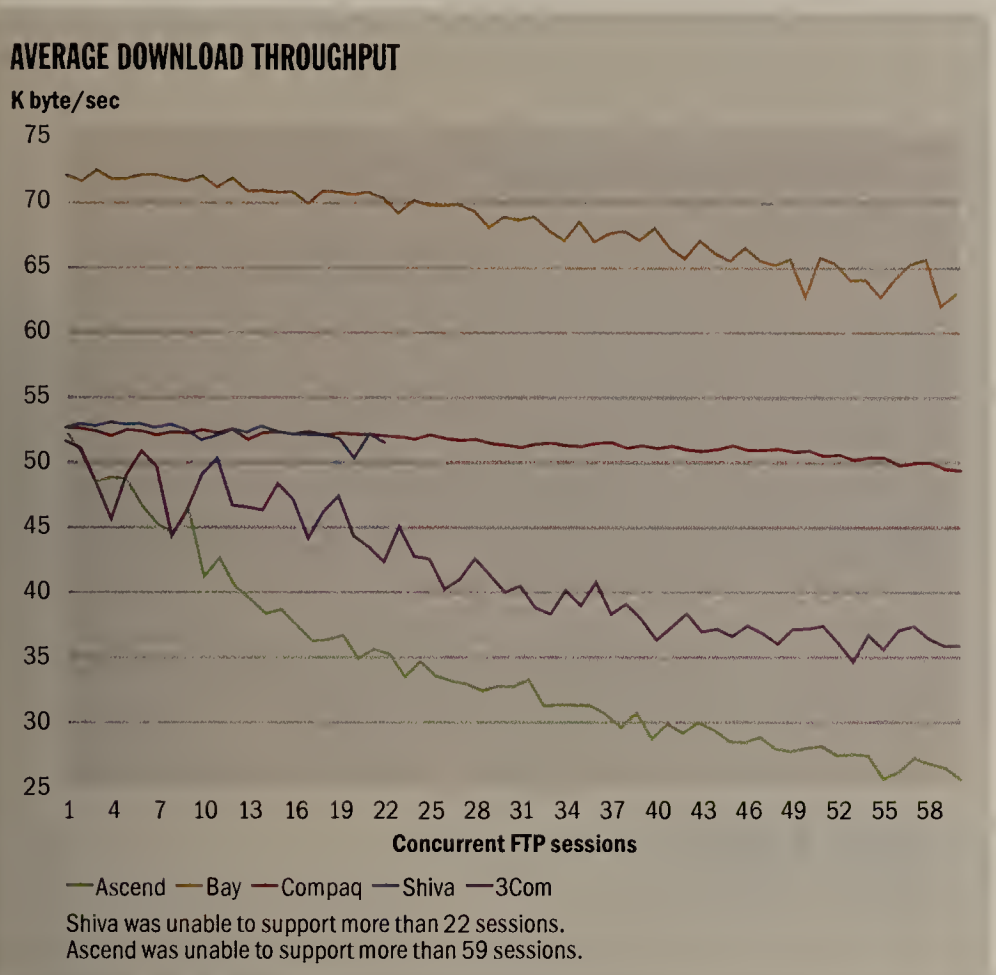
Our testers requested Ascend's help in diagnosing why the MAX 6000 was dropping calls coming into the first WAN port. In an attempt to solve the dropped calls problem, Ascend upgraded the unit with the latest version of firmware and had us move a PRI connection from the first WAN port to the fourth, suspecting the first WAN port was at fault.

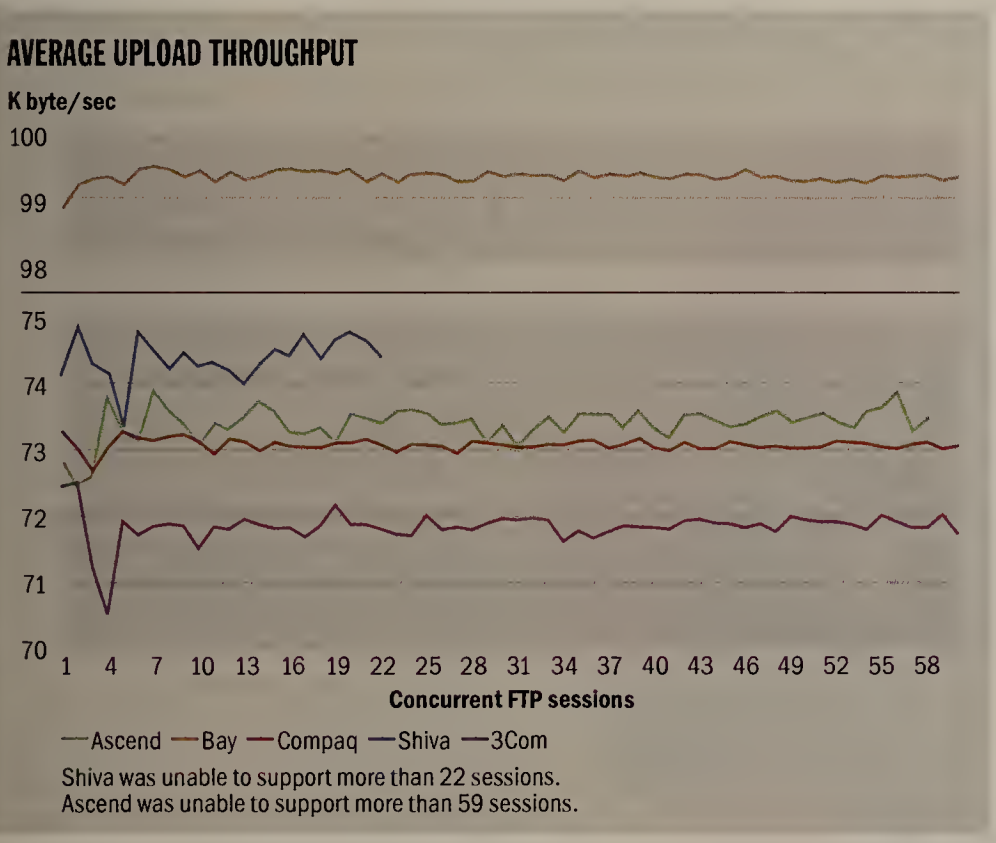
With 60 clients calling into the machine, we only needed three WAN ports to do our testing. Once the fixes were applied, things went more smoothly but the unit fell just shy of completing our test, which called for 60 clients to be simultaneously transferring files.

Concerned that the unit was unable to complete the test, Ascend kept working well past deadline to uncover the problem's cause. It was during that post-deadline examination that the clocking issue came to light.

Ascend asked us to retest the unit with the clocking disabled but we did not have the time. However, our testers were able to do trial runs with a few clients once the clocking on the inactive port was disabled. The unit's performance appeared to improve but it still dropped calls. Without a full retest, our testers can't say for sure whether turning the clock off would bring performance up across the board.

However, Ascend has contracted with XXCAL Testing Laboratories, Inc., the same company we worked with, to rerun the test at its own expense. Results from that test will be posted on XXCAL's Web site at www.xxcal.com.





To resolve the problem, Ascend upgraded the unit with the latest version of firmware and had us move a PRI connection from one WAN port to another, suspecting that the first WAN port was at fault. Once the fixes were applied, things went more smoothly, but the unit still could not complete our test suite.

The tests we did complete show that the MAX 6000's performance left something to be desired, coming in with an average upload speed of 73.4K bit/sec. Its average download speed of 35.1K bit/sec was the slowest of all. The slow download average came when the unit suffered a severe drop in throughput as the number of clients increased, going from 52.5K bit/sec for one client down to 25.3K bit/sec for 59.

On the plus side, the MAX 6000 was one of the slimmest chassis we reviewed, measuring a scant 4 inches thick. The chassis has four integrated T-1/PRI interface boards plus a nine-pin RS-232 port for management, one 10M/100M bit/sec Ethernet port and an attachment user interface port. Six slots are left open for modem boards that support 33.6K bit/sec and 56K bit/sec operation and can be upgraded to V.90. None of the boards are hot-swappable.

However, the unit has only four LEDs on the chassis front, giving you scant information on power, T-1/PRI line, data connection and hardware status. The lone power supply in the product we had represented a single point of failure that left the MAX 6000 chassis vulnerable.

Ascend deserves an honorable mention for being the second easiest product to install and configure, right behind Shiva. The documentation is easy to follow and ports are accurately labeled.

The simple-to-use configuration software is accessed via a PC using a terminal emulator with graphics character support, which means Windows' Hyperterminal is not appropriate. The MAX 6000 stores profiles for configuring user names and passwords, as well as data routing options, call answering configurations, encapsulation and many other options.

Overall, the setup software was effective, presenting a nifty and configurable six-window summary of status information to the right of the main menu. However, as is common with this type of configuration system, many of the commands are buried several layers deep in a tree-like structure. If you can recall five-digit menu codes, you can type them in to directly access sub-menu items, but otherwise you have to go fishing. A Windows GUI interface was not provided with this beta product but one will be available when the product ships.

Internal authentication is handled in part by the call answer profile you create using the configuration software. You can specify CHAP, PAP or an automatic authentication mode that will cycle through options until it matches what the caller is using. The product also supports various options for external server user authentication.

Ascend has big plans for the MAX 6000 when it comes to its feature set. For starters, the company plans to have routing support plus hooks to teleconferencing equipment and VPN capability. The company also has plans to support voice over IP on the MAX 6000, enabling the unit to act as a digital cross-connect system and to provide guaranteed quality-of-service options.

Shiva catches 22

Even though it dropped calls, Ascend's product fared much better overall than Shiva's LanRover Access Switch. Despite several rounds of calls with off-site technical support, we were unable to get to the root of the problem that caused Shiva's product to drop calls once it hit 22 simultaneous clients. We made a number of configuration changes recommended by Shiva and upgraded to the latest version of firmware, all to no avail.

As they attempted to diagnose the problem, Shiva technicians created a telnet session into the unit but could not find any obvious errors or other problems after we applied the recommended patches. Essentially, the company says that without an onsite technician, it was unable to come up with conclusive evidence of what caused the product to drop calls.

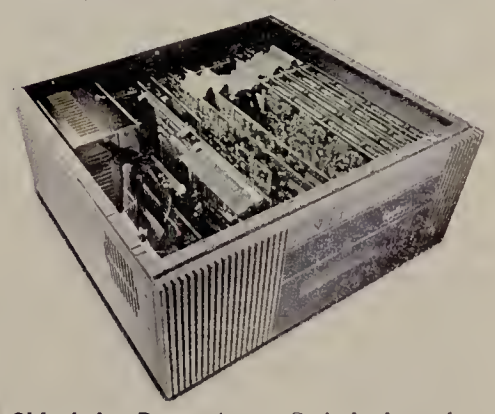
Up to the point where it started dropping calls, Shiva's server performed quite admirably, with a near steady throughput between one and 22 clients. In fact, it placed ahead of 3Com and Ascend at the 22-client level with an average upload rate of 74.2K bit/sec, 3.4% ahead of 3Com and 1.3% above Ascend. Its average download rate of 52.5K bit/sec blew past 3Com by 18% and squeaked past Ascend by 1.3%.

A big plus for Shiva is that its product was the easiest and quickest to get up and running thanks to a straightforward Windows-based configuration tool and an easy-to-use LCD-based interface on the front panel.

The configuration software enables you to manually enter information or use a wizard that prompts you to fill in blanks or select appropriate choices from a list. Things get easier once you realize that you can enter an IP address via the front panel LCD, something that isn't mentioned prominently in the product's quick-configuration guide.

The industrial-strength chassis, which looks like a PC with 11 ISA-like slots, comes with only one power supply, a drawback when you consider that 3Com, Compaq and Bay provide redundant power supplies. The unit we got had only one open slot, which was labeled "for future hardware."

The product turned out to be the least modular of the ones we reviewed, accepting its cards vertically as opposed to horizontally as the



Shiva's LanRover *Access Switch showed steady performance until it starting dropping calls a third of the way into our test script.*

Sizing up remote access servers

ISP class security, fault tolerance and port density are trickling down to benefit corporate networks.

By Tim Greene

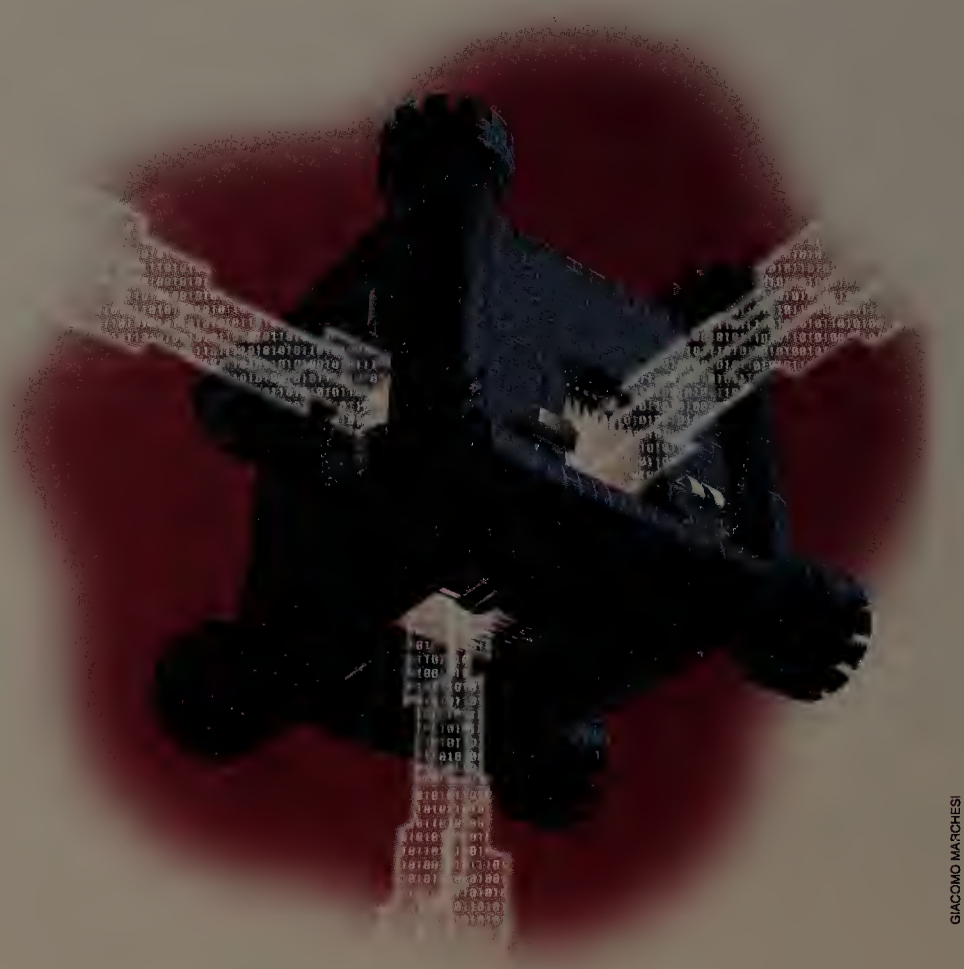
ISSUES AND TRENDS

While most network equipment vendors try to dazzle you with grandiose claims of new cutting-edge features, remote access server providers remain focused on the bread-and-butter basics. And well they should, because it's the basics — authentication, encryption, compression, modularity, fault tolerance and port density — that will serve you well when it comes to enterprise-level remote access.

That said, there is one feature that's starting to stand out as a popular accompaniment to those core functions: a virtual private network (VPN). VPNs can save you big bucks on your long-distance telephone bills by using the Internet to tie remote users to the corporate backbone. But VPNs add something else too — network security vulnerabilities.

Look for an enterprise-class remote access server that enables VPNs and sports ironclad security. These boxes also give you the flexibility of maintaining direct dial-up ports for remote users who connect through a local call or those who want to use a secure dedicated circuit.

Because many of you want the biggest and best remote access server vendors have to offer, our Buyer's Guide Chart focuses on hardware-based products with a minimum of 24 ports. After all, these are the boxes that have the most differentiating features.



GIACOMO MARCHESI

Stripped-down models can function as simple access concentrators with modems and a LAN feed. But higher end products can be fitted with a battery of security ranging from simple user name/password to secure token support.

Just under half of the remote access servers on the chart support tunneling technology that encrypts IP packets and encapsulates them for transport across IP networks.

In this initial phase of deployment, tunneling is best suited for remote access. Remote users call their local Internet service provider, use the Internet for a long-haul link, then reach the corporate site over a dedicated feed from the ISP. Expected upgrades will improve management, making it easier to assign limited access rights for extranets.

All but one product in the chart — Lantronix's LRS32F — are modular chassis-based systems. Most of these devices support authentication, authorization and encryption. Enhanced management interfaces make it easier for administrators to establish and maintain VPNs.

For example, 3Com Corp. this spring is expected to release Web-based management tools for its Total Control HiPer Access System/Edge-Server Pro Module, part of the product line 3Com gained last year when it acquired U.S. Robotics. The tools enable you to set up and manage security features such as IP tunnels, controlling access based on time of day and session length. 3Com will add tunneling support to the Total Control box this spring.

Other vendors with current or planned support for some form of tunneling — including Adtran, Inc., Ascend Communications, Inc., Bay Networks, Inc., Compaq Computer Corp. and RAScom, Inc. — claim their remote access servers will support the Layer 2 Tunneling Protocol after the standard is set others did. That could make maintenance more difficult, because the cards are all connected to a ribbon cable that handles timing among them.

User authentication can be accomplished using integral support for PAP/CHAP or via various external servers supporting RADIUS, TACACS+ and a variety of other methods.

Shiva also doesn't have much to offer in the way of special features when you stack it up against the other products in this review. You won't find support for routers or LAN servers with this unit. In fact, you even need separate boards for 33.6K bit/sec and 56K bit/sec modems. You can't flash-upgrade the 33.6K bit/sec modem cards to support higher speed, but you will be able flash-upgrade the 56K bit/sec modem cards to the V.90 standard. None of the cards are hot-swappable.

The bottom line is this: If you can't afford to be dropping calls in the middle of a crucial file transfer and want the best throughput, take a good look at Bay's product. On top of its first-rate throughput, the unit is versatile and has enough capacity to handle 576 calls when fully configured. That capacity jumps to thousands of calls when you consider you can bolt four chassis together.

Conant is network project manager, Renteria is lead network test engineer, Deneys is senior automation specialist and Sukert is vice president at XXCAL Testing Laboratories, Inc., a worldwide independent test lab specializing in software and hardware compatibility, functionality and performance testing headquartered in Los Angeles. Visit XXCAL on the Web at www.xxcal.com.

How we did it

We used 60 Dell Computer Corp. OptiPlex PCs with 166-MHz Pentium processors and 32M bytes of RAM to transfer five 32K-byte test files conforming to the Electronic Industry Association's TSB-38 standard for evaluating modems. Files were transferred to and from an AST Research, Inc. Manhattan D server with a 200-MHz Pentium Pro processor and 320M bytes of RAM running Windows NT Server 4.0 with Service Pack 3 and Internet Information Server 4.0. The server had a 100M bit/sec Ethernet connection to the remote access server.

Each PC was connected to a 33.6K bit/sec modem housed in a 3Com Corp. MP/16 V.34 Total Control Modem pool and used Windows 95's dial-up networking utility to dial in to our on-site Lucent Technologies, Inc. Definity G3 PBX using PPP. The PBX used three ISDN PRI lines to feed calls to the remote access server.

During testing, all of the remote access servers were configured to authenticate users using CHAP and to autoassign IP addresses. All clients used the same user name and password.

We created our own automated test script that opened a DOS window on each client, loaded the file transfer protocol program supplied with Windows 95 and typed the commands needed to upload and download the files. Throughput was measured at each client using the statistics provided in the FTP program, which ignored the transmission of FTP commands in its calculations.

All 60 clients dialed into each remote access server at once. When all calls were connected, one client started transferring files. When it finished we then had two clients active. We kept adding one client at a time until all 60 were simultaneously active or the remote access server dropped calls. We ran each test three times and averaged the results. If calls were dropped, we used results from the three best tests.

sometime this year.

Virtually all vendors included in the chart support a battery of authentication security mechanisms, including the Terminal Access Controller Access Control System (TACACS), Challenge Handshake Authentication Protocol/ Password Authentication Protocol (CHAP/PAP), dialback and Remote Authentication Dial-In User Service (RADIUS).

These security options range in sophistication. Dialback, for example, simply identifies the phone number of an incoming call. The remote access server only calls back authorized numbers to initiate a connection. A step up is CHAP, in which the server issues a challenge — a unique code — to the calling client. The client responds with a password that is encoded based on the challenge it has received. In theory, only an authorized client will be able to respond with a properly encoded response.

TACACS and RADIUS support communication between the remote access server and a separate security server that performs authentication. In addition, RADIUS provides call accounting and can define limits on individual or group access rights. Some vendors even support Kerberos server-to-server authentication.

Many of the advanced features of high-end remote access servers are designed for service providers, but these features parlay into benefits for corporate users, too. For example, voice-over-IP capabilities enable ISPs to offer new voice services, but the technology also represents a cost-saving opportunity for the enterprise.

Some remote access servers can route voice calls to distant sites over an IP network, including the Internet, obviating long-distance phone charges or the need for separate voice trunks. Total Control, for example, already supports IP voice, and vendors such as Ascend, Bay and Cisco have promised support in upcoming models of their boxes.

Among the differences you'll find between enterprise-class servers and their poorer cousins are redundant power supplies, hot-swappable cards and support for ever-increasing port densities.

For example, Bay's Versalar 5000 Access Switch and Versalar 5399 Remote Access Concentrator Module support dual channelized T-1 cards with 48 modems. The cards provide the building blocks for enormous capacity (see review, page 46). Other vendors, such as start-up Aptis Communications, Inc., specialize in port density. Aptis' CVX 1800 crams 1,344 modems on a single shelf.

At the same time, vendors are trying to keep the number of required modems to a minimum. For example, Compaq's Microcom 6200 concentrator can direct calls to the desired network device via any available route. If all direct modem connections to a particular LAN-based asynchronous device are busy, Compaq's ADAPTive switching technology sniffs out alternate routes and modems.

You'll find enhancements to some of the more traditional remote access server features, too. Most of the products featured in the chart had 56K bit/sec modem support before the preliminary V.90 modem standard was set in February. Modem vendors accept those specifications as the likely standard and are readying software upgrades to make their devices compliant.

What's more, most of the products included in the chart continue to support ISDN via Primary Rate Interface trunks.

3Com and Cabletron Systems, Inc.'s products support digital subscriber lines (DSL). DSL enables dedicated broadband access over regular phone lines to support power users who need to move big files to and from remote offices or home. DSL is still maturing and service availability is limited so far, but it's coming.

Thanks to new cards and software upgrades that can add functionality, today's remote access servers stand to live long lives. ■

PRODUCT CHART: REMOTE ACCESS SERVERS

Company	Product	Architecture						WAN links													LAN links		
		System type	Base port capacity	Maximum port capacity	Processor type and speed	Backplane speed (in bit/sec)	Number of simultaneous users supported	Analog 28.8K	Analog 33.6K	Analog 56K	BRI	PRI	T-1	T-3	Frame relay	Wireless cellular	Wireless radio	X.25	xDSL	Cable modems	SONET	Ethernet	Fast Ethernet (100 Base-T)	Gigabit Ethernet
3Com Corp. (800) 638-3266 www.3com.com	Total Control HiPer Access System/EdgeServer Pro Module	Modular	23 T-1/PRI	420 E-1/PRI	100-MHz PowerPC	1G	420	•	•	•		•	•			•		•	•	•		•	•	
Adtran, Inc. (800) 923-8726 www.adtran.com	ATLAS	Modular	2 T-1/PRI	34 T-1/PRI	33-MHz i960	100M	192	•	•	•	•	•	•	•	•							•		
Advanced Computer Communications (800) 666-7308 www.acc.com	Tigris family	Modular	12 Analog	248 Analog	50-MHz 68060	1G	248	•	•	•		•	•		•	•	•	•				•	•	
Aptis Communications, Inc. (978) 250-3888 www.aptis.com	CVX 1800	Modular	96 ISDN/ modem	1344 ISDN/ modem	200-MHz PowerPC	5.8G	1,344	•	•	•		•	•	•	•	•						•	•	
Ascend Communications, Inc. (510) 769-6001 www.ascend.com	MAX 6000	Modular	8 ISDN/ modem	120 ISDN/ modem	64-MHz i960	1.1G	120	•	•	•	•	•	•		•	•		•	•			•	•	
Bay Networks, Inc. (408) 495-1900 www.baynetworks.com	Versalar 5000 Access Switch/5399 Remote Access Concentrator Module	Modular	48 T-1	576 T-1	66-MHz AMD 486	1.2G	576	•	•	•		•	•									•	•	•
Cabletron Systems, Inc. (603) 332-9400 www.cabletron.com	CSX7000	Modular	4 BRI	48 BRI	120-MHz Pentium	128M	288	•	•	•	•	•	•		•			•	•			•		
Cisco Systems, Inc. (800) 553-6387 www.cisco.com	Cisco 3640	Modular	28 Asynch-ronous/BRI	100 Asynch-ronous/serial	100-MHz R4700	300M	60				•	•	•		•			•				•	•	
Compaq Computer Corp. (800) 822-8224 www.microcom.com	Compaq Microcom 6200 Remote Access Concentrator	Modular	12 Analog	32 PRI	100-MHz MC68360 and MC68040	80M	192	•	•	•		•	•									•		
Digi International (800) 344-4273 www.dgii.com	PortServer II	Modular	16 Asynch-ronous	64 Asynch-ronous	30-MHz IDT 3051	10M	640	•	•				•		•			•				•		
ECI Telematics (818) 880-4900 www.telematics.com	Nevada	Modular	12 Analog	120 Analog	100-MHz Pentium	1G	120	•	•	•	•	•	•		•			•				•		
Hayes Corp. (800) 445-3687 www.hayes.com	Century 9200 and 9400	Modular	8 Analog	24 to 48 T-1	33-MHz 80360	100M	24 to 48	•	•	•		•	•		•							•		
ITK Telecommunications, Inc. (888) 485-4685 www.itk-intl.com	NetBlazer 6100	Modular	24 Analog	60 Analog	133-MHz 486Dx4	10M	30	•	•	•	•	•	•		•							•		
Lantronix (714) 453-3990 www.lantronix.com	LRS32F	Fixed	32 Asynch-ronous	32 Asynch-ronous	40-MHz IDT 3071	1G	32	•	•	•	•		•							•		•	•	
Mitel Corp. (613) 592-2122 www.mitel.com	XpressWay RLAN	Modular	8 BRI	10 PRI	33-MHz Pentium	112M	240	•	•		•	•	•		•			•				•	•	
Multi-Tech Systems, Inc. (800) 328-9717 www.multitech.com	CommPlete Communications Server CC9600	Modular	24 T-1	192 T-1	100-MHz Pentium	8M	192	•	•	•		•	•									•	•	
Northern Telecom, Ltd. (800) 466-7835 www.nortel.com	DS112	Modular	12 Analog	72 Analog	50-MHz 68060	1G	72	•	•	•	•	•	•		•	•						•	•	
Osicom Technologies, Inc. (888) 674-2668 www.osicom.com	IQX-200	Modular	72 T-1	168 T-1	200-MHz Pentium	1.3G	168	•	•	•	•	•	•									•	•	
Perle Systems, Inc. (800) 467-3753 www.perle.com	Perle 833AS Remote Access Switch	Modular	24 T-1	60 E-1	133-MHz 603E	1G	60	•	•	•	•	•	•									•	•	
RAScom, Inc. (800) 727-6420 www.rascom.com	RAServer Series 2000	Modular	16 BRI	60 to 900 PRI ISDN	200-MHz Pentium	1G	60 to 900	•	•	•	•	•	•		•			•			•	•	•	•
Shiva Corp. (781) 687-1000 www.shiva.com	LanRover Access Switch	Modular	12 ISDN	72 ISDN	66-MHz 68060	800M	96	•	•	•	•	•	•	•	•							•	•	
Versanet Communications, Inc. (888) 982-4638 www.versa-net.com	ISP-Accelerator 2001	Modular	4 Analog	60 E-1	100-MHz Pentium	10M	60	•	•	•	•	•	•		•							•		
Xyplex Networks, Inc. (800) 338-5316 www.xyplex.com	EdgeBlaster	Modular	60 ISDN PRI	120 ISDN PRI	166-MHz Pentium	1G	120	•	•	•		•	•		•							•	•	

Chart features remote access servers with a minimum of 24 ports that provide their own remote node software, operating system and management features. Products highlighted in color were tested. Lucent Technologies, Inc. failed to

LAN links						Dial-in protocols						LAN protocols		Security								Compression		Management												Cost
Token ring	CDDI	FDDI	ATM	Appletalk	Wireless LANs	Point to Point Protocol (PPP)	Point-to-Point Tunneling Protocol (PPTP)	Layer 2 Tunneling Protocol (L2TP)	SLIP	IPSec	Layer 2 Forwarding (L2F)	IPX	TCP/IP	CHAP	CLID	Dialback	Password encryption	PAP	Packet filtering	RADIUS	TACACS+	Compresses/encrypts file	Data compression ratio	Requires terminal for installation/management	Offers Web-based management	Defines virtual groups of telephone numbers	Remote account set-up	Monitors logon/failures	Monitors call start/stop/duration time	Configures auto-logging on specific user	Provides trace history of received calls	Force disconnect	Block reconnect	Monitors faulty modem	SNMP Version supported (1 or 2)	Fixed-port unit cost or range; modular range (base level through fully configured)
•							•	•	•			•	•	•	•	•	•	•	•	•	•		10:1			•	•	•	•		•	•	•	•	1 and 2	$22,000 to $180,000
						•	•	•	•			•	•										8:1	•					•						1	$11,000 to $47,000
•			•	•		•		•				•	•	•	•	•		•	•	•		•	4:1		•	•	•	•	•	•	•			•	1	$24,995 to $150,000
						•	•	•	•		•		•	•	•		•	•	•	•			8:1	•	•	•	•	•	•	•	•	•	•	•	1	$59,000 to $500,000
				•		•	•	•	•			•	•	•	•	•	•	•	•	•	•		4:1	•		•	•	•	•	•	•	•	•	•	2	$14,000 to $64,000
•		•	•	•		•			•			•	•	•		•	•	•	•	•		•	4:1	•	•	•	•	•	•		•	•		•	1	$24,785 to $284,930
				•		•				•	•	•	•	•	•	•	•	•	•	•	•	•	4:1			•	•	•	•	•	•	•	•	•	1	$21,500 to $84,000
•				•		•			•		•	•	•	•	•	•	•	•	•	•	•	•	2:1	•	•		•	•	•	•	•	•	•	•	1 and 2	$12,300 to $28,900
						•	•	•	•		•	•	•	•	•			•	•	•	•		NA	•		•	•	•	•		•	•			2	$15,000 to $100,000
						•			•			•	•	•				•		•			NA				•	•		•		•		•	2	$2,395 to $5,080
						•		•	•				•	•	•		•	•		•			NA		•	•	•	•	•		•	•		•	2	$26,050 to $70,150
						•			•			•	•	•		•		•		•			4:1	•		•	•	•	•	•	•	•	•	•	1	$8,995 to $16,995
•				•		•			•			•	•	•		•	•	•	•	•			2:1		•	•	•	•	•			•	•		2	$15,299 to $33,000
						•			•			•	•	•		•		•	•	•			8:1		•			•	•	•		•			1	$3,995
						•						•	•	•	•	•	•	•	•	•	•	•	8:1	•		•	•	•	•	•	•	•	•		2	$300 to $1,000
						•	•		•			•	•	•		•	•			•	•		4:1	•	•		•	•	•		•	•	•	•	2	$19,548 to $80,145
•				•		•			•		•	•	•	•	•	•	•	•	•	•	•		4:1	•		•	•	•	•		•	•	•	•	2	$14,400 to $50,100
	•	•	•			•						•	•	•	•	•		•	•	•			4:1	•			•	•	•	•	•			•	1	$7,000 to $60,000
•				•		•	•					•	•	•		•	•	•		•			4:1	•		•	•	•	•	•	•	•	•	•	1	$11,040 to $35,800
•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	8:1	•	•	•	•	•	•	•	•	•	•	•	1 and 2	$9,500 to $180,500
•				•		•	•		•	•	•	•	•	•	•	•	•	•	•	•	•		4:1	•	•	•	•		•		•	•	•	•	1	$10,240 to $50,100
						•			•				•	•			•	•	•	•			4:1	•			•	•	•		•	•		•	1 and 2	$3,870 to $10,896
						•							•	•	•	•	•	•	•	•		•	4:1		•	•	•	•	•	•	•	•	•	•	1 and 2	$10,000 to $31,000

provide complete product information for PortMaster3 in time to meet our deadline.

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1998 Seminar Tour

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3/11	Boston, MA
3/12	New York, NY
3/24	Chicago, IL
3/25	Washington, DC
4/7	Atlanta, GA
4/8	Dallas, TX

Presenter
Beth Gage
TeleChoice, Inc.

NetworkWorld
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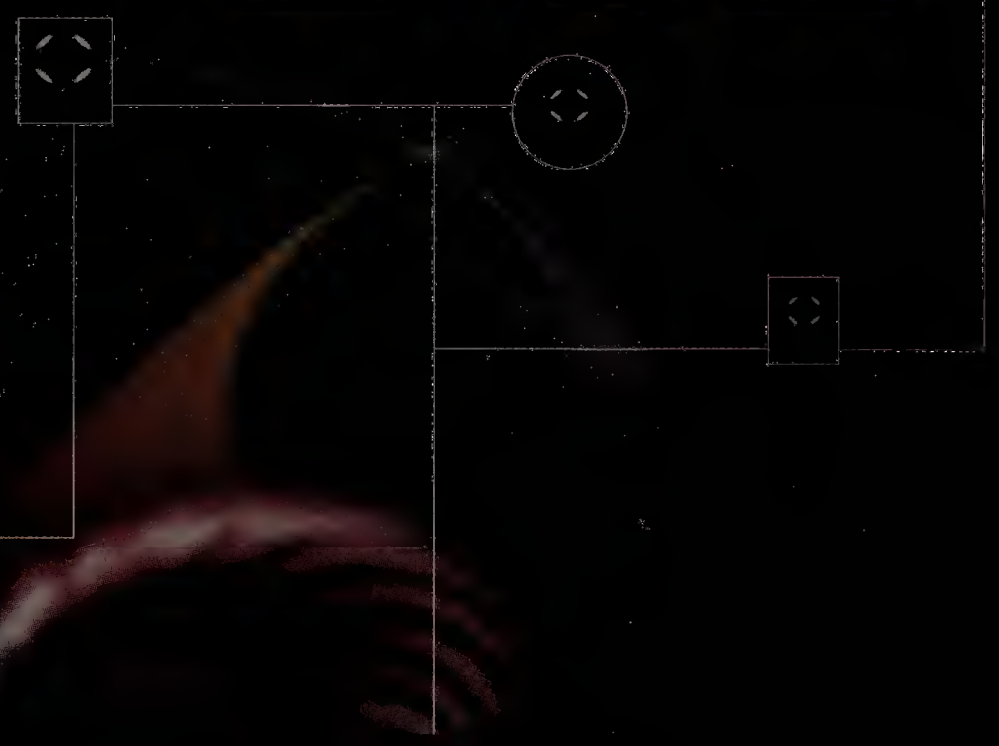
High Speed Remote Access Solutions with xDSL



Seminar Overview

xDSL has fast captured the networking community's interest as a possible solution to the throughput bottlenecks that plague today's access networks. xDSL holds tremendous potential for providing high speed network access but like any new technology, there are potential pitfalls. There is also a strong business case for xDSL in certain environments. The key is knowing when and what type of xDSL to deploy to meet your networking requirements and how this emerging family of technologies fits into your present remote access strategy.

High Speed Remote Access Solutions with xDSL will assist service providers, network managers, system integrators and end users in the assessment of this revolutionary new broadband access technology. This one-day seminar is taught by leading xDSL consultant Beth Gage of TeleChoice, Inc. The seminar will provide a thorough analysis of the emerging xDSL technologies and how they will compare to tried and true remote access solutions like ISDN and analog-dial up.

In addition you will learn the difference between each of the xDSL offerings, which applications they support and when they may be available in various service areas. Find out how xDSL differs from today's remote access service offerings and which xDSL-enabled services will be offered first and from whom.

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3. Analyze the benefits and limitations of using transport technologies such as ATM and Frame Relay with DSL.
4. Explore how xDSL products differ and which to choose for your application.
5. Learn how the DSL market is going to grow globally and at what rate.
6. Look at the business case for xDSL: which service offerings provide the best bandwidth for the buck and when does it make sense to migrate from traditional services to xDSL.
7. Review service offerings that are available today and learn how network managers are using xDSL to meet their company needs.
8. Understand how DSL affects the Customer Premises — what are special wiring requirements, CPE functionality and form factors.
9. Learn the steps for deployment, how to contact a service provider(s), negotiate service contracts and if service level agreements are available.
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HEAD to HEAD

Is Java ready for the enterprise?

DANUTA OTFINOWSKI

KEVIN HAISLIP

A couple of years ago, Java was just a novelty with great promise. Now it has matured to the point where it is an excellent choice for an enterprise computing platform.

Initially, Java's Abstract Windowing Toolkit was criticized as a poor man's windowing system that lacked functionality and sophistication. That changed with the release of the Java Foundation Classes (JFC). JFC contains a wide range of user interface components that rival those of more mature systems such as Windows and Macintosh.

The Java Development Kit (JDK) 1.1 contains some of the best enterprise technology available. It includes Java Database Connectivity, which enables developers to access almost any database in a platform-neutral way; Remote Method Invocation, which allows developers to write software that can communicate with Java applications across networked machines; and JavaBeans, which speeds up application development by allowing developers to build applications using off-the-shelf components.

But the sleeper technology that will really sell Java in the enterprise is Java Web Server and servlets. Servlets are server-side Java components that can be used to create dynamic Web content. Historically, dynamic Web content was implemented using Common Gateway Interfaces (CGI) written in Perl or other scripting languages. CGIs were simple to use but caused poor Web server performance. High performance on the server side could only be achieved by using shared objects written in C and linked with the Web server itself. However, this improved performance exacted a price: reliability. A bad pointer in a shared object linked with a Web server would bring down the entire server.

Java servlets deliver the best of both worlds: reliability and performance. If a buggy servlet fails, it doesn't bring down the entire Web server. And servlets don't hurt performance, because the Web server loads them only once. CGIs, on the other hand, must be loaded each time a user hits a page.

Performance has been a big concern since Java's first public release. Java got a bad rap because the first Java Virtual Machines (JVM) — the software that enables Java programs to run — had high overhead. The current generation of Just In Time-compiled JVMs yields performance close to, if not better than, C++ programs.

Any discussion of Java technology cannot ignore tools. Just two years ago, the JDK was the only Java development tool available. The JDK worked but was not flashy and intuitive like C++ and Visual Basic integrated development environments (IDE). The past year has seen an explosion of IDEs from industry leaders, such as Symantec Corp., Borland International, Inc. and IBM, that are easily on par with C++ IDEs.

In terms of scalability and security, Java is unmatched. JVMs are available for almost every combination of processor and operating system in use today. Java's multithreading capabilities, which are key to scalability, exploit all of a platform's computing power by keeping the processors of high-end servers busy at all times. And Java's security is so robust that to date no one has successfully exploited a security hole in a JVM.

There is no doubt that Java is ready for the enterprise today. And in the coming years, there will be even more improvements.

Siddalingaiah is a consultant and vice president of Java Lobby, a worldwide nonprofit organization that promotes Java. He can be reached at (301) 996-5052 or madhu@madhu.com.

Selecting an enterprise computing platform is probably the most important decision you'll make. Should you bet the farm on Java or stick with Windows? Before you answer, think about the requirements of an enterprise computing platform and compare Java to Windows' Distributed Networking Architecture (DNA).

For example, all applications should be scalable. Windows DNA provides a very robust, scalable architecture that lets you run an application on anything from a single laptop to several multiprocessor servers with support for transactions and load balancing. For now, the only way to make Java server applications scalable is to use a bigger server. There is no Java standard for transactions or load balancing.

The development tools you use will affect how fast you can deliver your application. Windows DNA has a number of powerful development environments, such as Visual Basic, Visual C++, PowerBuilder and Delphi. Java development environments are only beginning to approach the level of productivity that their Windows-specific counterparts provide.

No business applications could be created without access to all your corporate data and integration with your existing applications. Corporations have integrated their Windows solutions with legacy applications and corporate data for years, but this is an area where Java has some severe and prohibitive limitations. With the exception of a limited number of Java Database Connectivity drivers, Java applications are completely isolated from other corporate applications and data. Don't even think about integrating Java applications with desktop applications such as word processors, spreadsheets or other applications you've already built.

When you're building applications that work with your corporate data, security is a primary concern. Windows DNA provides a complete infrastructure for protecting access to the different resources on your network. Because Java needs to support multiple operating systems, it can support only the lowest common denominator in security features.

Finally, there's the issue of cross-platform support. With Windows DNA, you can use Dynamic HTML and VBScript or JavaScript on the client side to build applications that run identically on Windows, Macintosh and Unix operating systems.

Cross-platform support is Java's biggest promise, but it could turn into your worst nightmare. Not only has Sun issued numerous releases of the Java Development Kit, but browser vendors also have modified each JVM with their own enhancements. Consequently, Java applications that run fine in one browser can severely malfunction in another. This means you must test and debug your application on all the different browsers in which your Java application may run.

Companies that have believed in Java have failed miserably. Corel Corp. tried to develop a Java version of its office application suite but had to cancel the whole project because Java was too slow and supporting the various JVMs was a nightmare. Netscape Communications Corp. stopped developing its own JVM and a Java version of Navigator. Even Java's most fanatic champions have realized that Java simply doesn't deliver on any of its promises. Do you want to bet your company and career on a sinking ship?

Sax is president of Sax Software Corp., a Windows component developer in Eugene, Ore. He can be reached at (541) 344-2235 or mike@saxsoft.com.

Management Strategies

Sweet rewards

SCC Communications finds fun, personalized bonuses go further than cash.

By Lenny Liebmann

When you simply have to ensure that your network stays up, sometimes a kayaking trip can be just the ticket.

It's worked for Steve Meer, vice president and chief technology officer at SCC Communications Corp., a Boulder, Colo.-based 911 infrastructure and database service provider for approximately 60% of the U.S. In such a high-pressure environment, it's important not only to build the most fault-tolerant network you can, but also to keep employees on their toes as well.

With that in mind, Meer has developed a unique incentive program whereby staffers who perform above and beyond expectations are rewarded with personalized bonuses that reflect their interests, whether that be kayaking or vintage cars. These prizes go much further than cash in instilling goodwill.

SCC's systems are able to track moves, adds and changes to phone services — including the physical location of individual residential and business lines — to ensure that its databases are completely up to date. When a person makes a 911 call, SCC routes the call to the proper local 911 response agency and guarantees the accuracy of information displayed on the 911 operator's screen. Any glitch in the company's service delivery mechanism can have horrendous consequences.

Redundancy times three

From a technical point of view, redundancy is a primary consideration for SCC. The company has triple-redundant links to each of its critical service points: a primary landline, a secondary backup and a satellite circuit waiting in the wings. Secondary circuits don't just sit idle. They are used actively for load balancing or to shuttle keep-alive traffic so their readiness can be constantly monitored.

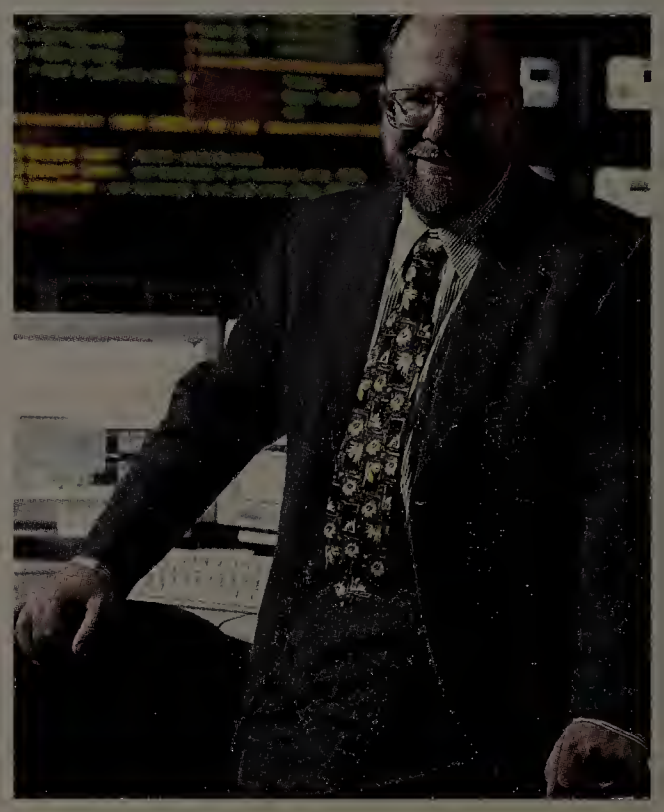
Additionally, a pair of fault-tolerant Tandem Computers, Inc. servers provide continuous availability on the systems side. "Heartbeat" scripts constantly monitor the servers' processes and send an immediate alert if there is even a momentary lack of response. Computer Associates International, Inc.'s Unicenter TNG serves as the unified operator console for tracking the diverse network, systems and application activity.

But all that redundancy and monitoring capability won't do SCC any good if its technicians drop the ball. In fact, without proper leadership, Meer notes that such resilient infrastructure can actually create its own set of problems. "Because there's so much diversity, you can be lulled into thinking that a failure in one part of the system is OK, instead of treating every alarm as if it was the one that your own son or daughter is going to live or die by," he explains.

To imbue employees with that sense of criticality, SCC provides extensive training that includes video presentations on the human impact of 911 services. The company also has highly rigorous and formalized procedures for reporting, escalating and resolving alarms — procedures that are applied whether it's a red alert in the middle of the day or a yellow condition in the middle of the night.

"We don't need to sound a Klaxon horn every time something happens," Meer says. "We have clearly established methods for people to follow, and we're constantly refining them."

As part of the company culture of accountability, SCC's escalation policy extends all the way up to the executive level. "At most companies, you typically see the ultimate responsibility for network problems stop with some senior network manager," notes Meer. "But here, everyone carries a beeper. My name and the CEO's name are on the notification lists, too."



COLIN FARRELL

SCC Communications' *Steve Meer rewards his top performers with highly personalized prizes.*

Unique incentives motivate staff

SCC also puts a strong emphasis on rewarding achievement as a way of maintaining morale in such a high-pressure environment. "The founders of this company, including myself, came out of government, where it didn't matter how hard you worked," Meer explains. "So when we started this company, we determined that we were going to give people incentives to reach a higher level of performance."

However, the first time SCC's executives handed out a bonus to a group of engineers who had performed above and beyond the call of duty, they received a rude awakening. "Here we were all excited about giving these guys a check, and they just kind of looked at it and went 'Oh,'" Meer recalls. Even as SCC formalized its Employee of the Month program, Meer and his fellow executives realized that simple cash awards weren't really the powerful incentives they thought they'd be.

After careful consideration, Meer decided to change the nature of the bonuses from simple cash to highly personalized prizes. One of the first such awards was a custom-built kayak, along with an all-expenses-paid trip to Costa Rica for an SCC engineer who was an avid kayaker. "He had confided to his coworkers that he had always dreamed of going to this place to kayak," Meer says. "When we made that dream come true, the guy actually cried."

Other special prizes have included hard-to-find parts for an employee's vintage car, a family vacation to Disneyworld and a new redwood deck. "We have our spies find out what the person really wants or needs. And then we do some 'value engineering' to see how we can give it to them," Meer says.

Such bonuses don't necessarily cost much more than a cash award, Meer says, but the impact is much greater. "With a check, you just pay some bills," he says. "The way we're doing it now, you're giving someone a real life experience."

An unexpected side benefit of the new incentive program is how it affects other staff members. "People get a lot of vicarious pleasure out of these things," Meer says. "For weeks afterwards, they're asking the person questions about their experience and sharing the joy of it."

Because teamwork is so important to SCC's network and systems management methodology, the company is starting to use the same principle to reward groups of employees with team prizes such as ski trips.

The success of SCC's combination of fault-resilient technology and highly motivated employees is proven in the company's spotless performance. "In the six years we've been doing this, we haven't had a single backbone or systems failure that has led to the loss of 911 service," Meer boasts.

Liebmann is a consultant and freelance writer in Highlands, N.J. He can be reached at ll@hiway1.exit109.com.

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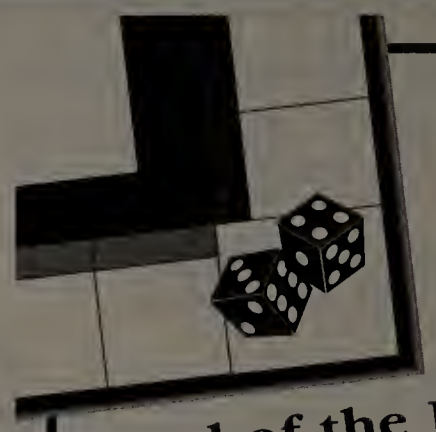

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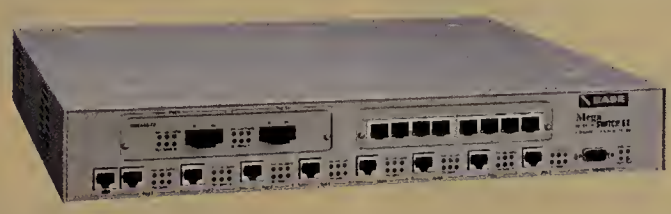

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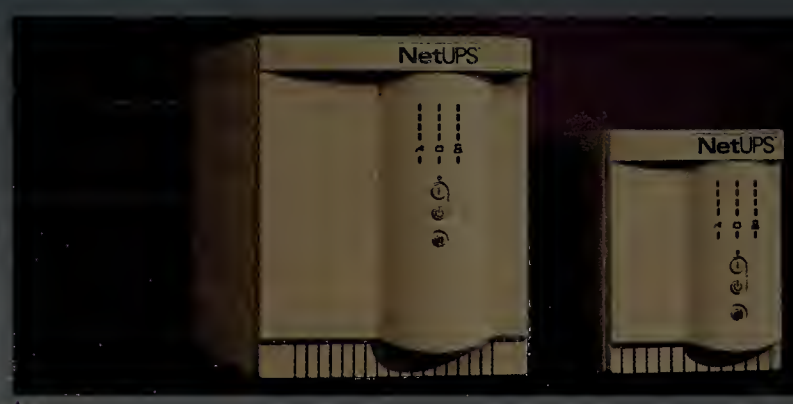

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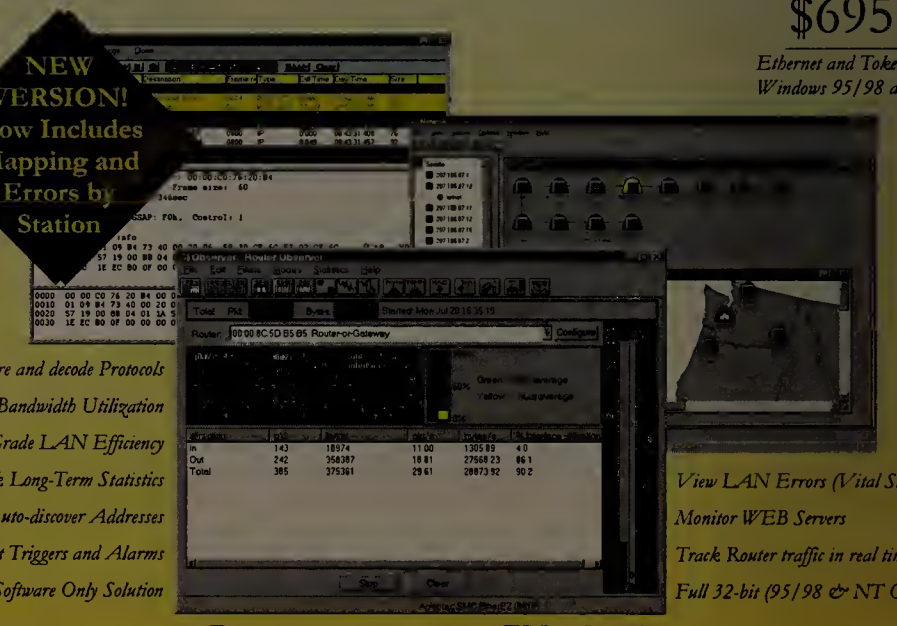

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The vendor list for the Remote Access Servers Buyer's Guide is on page 4B.

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DIRECTORY OF SERVICES

Ascend offers security plugs

Pipelines and MAXs are vulnerable to attack.

By Tim Greene
Alameda, Calif.

Ascend Communications, Inc. last week issued a suggestion for fixing a potential security flaw in its Pipeline routers and MAX remote access servers. Both are heavily used in corporate and Internet service provider networks.

The problem, brought to light by Secure Networks, Inc., a computer security research firm in Calgary, Alberta, is that Ascend left a door open that hackers can use to block user access to networks.

The service-denial threat stems from a weakness in the configuration ports on both Ascend products, Secure Networks said. The ports can be accessed using Java Based Ascend Configurator, a Java application used to configure remote devices and to have routers announce themselves to the configurator.

A management PC running the configurator program communicates with remote devices using a custom User Datagram Protocol (UDP) probe packet. The Ascend equipment normally responds with another UDP packet. A hacker sending a malformed UDP probe packet can cause the router to seize up, denying access to all users.

Ascend said activating a local packet filter to weed out non-IP packets on the MAXs or Pipelines would address the problem. But by filtering all non-IP packets, it also disables the Java configurator. Ascend said it is working on a software fix that will address the hacking problem and leave the configurator functional.

While the security flaw could cause trouble, it also is easily fixed, according to Alfred Huger, a principal with Secure Networks. "It takes about five minutes and costs nothing," Huger said.

Secure Networks found the security chinks during testing that was part of a general review of the security of the devices, he said.

Ascend also suggested that other companies which use the Ascend boxes make sure they change the SNMP password default settings. In Ascend Pipelines and MAXs, the default "read" password for SNMP is "public," and the default "write" password is "write."

Both are easy to guess and, therefore, leave the SNMP data open to unauthorized use. That means hackers could easily read and set Management Information Base variables to new values and download complete configuration data.

The configuration information includes the telnet password, enhanced access passwords, network authentication keys, and user names and passwords for incoming and outgoing dial-up connections.

Once hackers had full access to the router, they could wreak untold damage and sniff traffic on the network it is attached to.

Simply changing the default passwords solves the problem, Ascend said.

✆Ascend: (510) 769-6001

SECURITY SCARE

To address security concerns with its Pipeline and MAX products, Ascend's advice is:

- ☑ Don't leave the routers in default configuration.
- ☑ Use a local packet filter to prevent unauthorized access through configuration utilities.
- ☑ Go to www.ascend.com/security report for more information.

Merger

Continued from page 1

for its marketing practices. The CWA in particular has often tussled with MCI over attempts to unionize MCI facilities.

Also attacking the merger are local telecom powerhouses GTE Corp. and Bell Atlantic Corp. "If this merger is approved without conditions, WorldCom will become 'an Internet emperor,'" said Bell Atlantic in a recent petition to the Federal Communications Commission to deny the merger. GTE officials have made similar comments.

MCI officials responded that MCI and WorldCom are a threat to GTE and Bell Atlantic, "but not in the way they would have you believe." Instead, MCI said GTE and Bell Atlantic are afraid of the merged company's ability to compete for local exchange business. So who's right?

One major tactic the merger opponents are using is they are throwing MCI's past hype about its Internet prowess back in its face. The merger partners now claim they will control only 20% of Internet revenues, but filings against the merger repeatedly cite past MCI statements that MCI alone carries up to 60% of the nation's Internet traffic.

"We're all guilty of this marketing material that makes outrageous claims as to what we support," conceded John Sidgmore, vice chairman of WorldCom and head of its UUNET Technologies, Inc. Internet subsidiary. The original MCI claim came from the days when it ran the National Science Foundation's NSFnet, "which then comprised 50% to 60% of the Internet," he said.

Yet merger opponents continue to throw two of Sidgmore's own past statements back at him. At one point last fall he told *The Washington Post* that WorldCom was making backbone acquisitions because "having a big network is a huge barrier to entry for competitors."

Then, shortly after WorldCom bid for MCI, Sidgmore told the same newspaper the merged company might sell off its residential accounts, explaining that "our strategy is not in the consumer business." The comment touched off a wave of concern that the FCC might look unfavorably on such a huge company abandoning residential customers, eventually leading WorldCom Chairman Bernard Ebbers and MCI Chairman Bert Roberts to write FCC Chairman William Kennard reiterating WorldCom's commitment to consumer telephony.

Nevertheless, the CWA and Bell Atlantic repeatedly cite these two statements in their regulatory filings and other antimerger material. In addition, the CWA is aggressively promoting to its 600,000 members a report compiled from MCI's recent filings with the Securities and Exchange Commission showing that its top executives stand to reap enormous bonuses from the merger deal (see graphic).

AN ISP REVENUE GIANT

MCI and WorldCom's coupled ISP business units will clearly be ahead of competitors based on 1997 revenue figures.

	In millions
WorldCom's UUNET	$567
GTE Internetworking	$279
MCI	$179
PSINet	$122
Digex	$49
AT&T WorldNet	$47
Sprint	$40
Netcom	$16
MindSpring	$8
Other	$2.3 billion

SOURCE: IDC, FRAMINGHAM, MASS.

In another of the classic rituals of regulatory pressure politics, opponents of the MCI/WorldCom merger are attempting to drum up grassroots support from "small businesses" — in this case, Internet service providers concerned about securing Internet backbone bandwidth for their customers.

One provider that has come forward is Utah's largest independent ISP, Xmission, based in Salt Lake City. Xmission's general manager, Sue Ashdown, is a veteran political activist who has battled US WEST, Inc. in proceedings before the Utah legislature and the state public utilities commission. Ashdown last year even organized a coalition of ISPs within the state to aid her in such battles.

But she said she hadn't given much thought to the MCI/WorldCom merger until she got a call in January from a CWA official asking her to weigh in against the merger. Now a firm opponent of the deal, Ashdown said both she and the CWA have a hard time drumming up support from individual ISP managers.

One other ISP has gone further, filing a formal petition to deny the transfer of MCI's required FCC facilities licenses to WorldCom. San Diego-based Simply Internet, Inc. hired the Washington, D.C. law firm Wilkes, Artis, Hedrick & Lane to attack not only the merger but also UUNET's existing policies.

In implementing ISP peering and interconnection charges last year, "UUNET has shown a clear intent to commandeer the Internet for itself," said Simply Internet's filing with the FCC.

Merger opponents were further heartened on Jan. 26 when a group called the United States Internet Providers Association (USIPA), represented by the same law firm, filed comments criticizing the merger on similar grounds. But the comments were withdrawn the next day.

Wilkes, Artis lawyer Rudolph Geist explained that a mix-up in communications between the law firm and USIPA members caused what Evans Anderson called a premature filing. Anderson, one of USIPA's board members and vice president and general manager of CAIS Internet, Inc., said CAIS believes that if the merger goes through it will not seriously threaten competition. Geist also said USIPA has no official position on the merger.

But another new trade group for ISPs is not so reticent. The North American Network Service Providers Association (NANSPA) describes itself on its Web site as a group of primarily midsize and regional ISPs dedicated to Internet self-regulation and the avoidance of charges for peering. Peering is the practice of backbone providers handing off roughly equal amounts of one another's traffic without going through the Internet's public network access points.

Claiming "great interest" following the mid-1997 implementation of peering charges by UUNET and others, NANSPA's online literature quotes officials of the group saying "charging for peering is completely contradictory to the fundamental design of the Internet."

NANSPA's literature claims it cannot reveal member names "due to intimidation by a few telco/ISP carriers." It does list its headquarters at the prestigious-sounding address of 2020 Pennsylvania Ave., Suite 667, in Washington, D.C. But *Network World* discovered that this address is a postal-receipt box at a Mail Boxes, Etc. store.

Calls to NANSPA's voice-mail number generated a return call from David Koch, president of Internet provider Fiber Network Solutions, Inc., in Columbus, Ohio, who said only that he is a member of NANSPA. Koch said he does not oppose the merger per se but wants MCI and WorldCom to agree to free and open peering, and is writing a letter to the FCC to that effect.

John Thorne, Bell Atlantic's senior vice president and associate general counsel, defends ISPs that are unwilling to help merger opponents. "Every time I talk to a small ISP, the company is scared of retribution," Thorne said.

One Internet provider that is not afraid of speaking out is GTE. After the merger, "retaining customers will become impossible," said John Curran, chief technology officer for GTE Internetworking, the carrier's Internet unit. Today, every ISP is motivated to maintain high-bandwidth and technically sound peering connections, Curran said. If MCI/WorldCom is handling 45% to 60% of the Internet traffic, that motivation is gone, he claimed.

But others noted that GTE's general counsel, former Bush administration Attorney General William Barr, has been calling and visiting colleagues among the state attorneys general. His efforts bore fruit earlier this month when Virginia Attorney General Mark Earley and South Carolina Attorney General Charlie Condon called on the Justice Department to conduct a thorough antitrust review of the merger.

GTE admitted that its public-relations agency had booked the room at the Capitol Hill hotel where Earley and Condon's announcement was made.

BIG MONEY COMING AND GOING

MCI's top three executives get huge bonuses just for staying on during the merger. They also are guaranteed further windfalls if they eventually are asked to leave:

MCI executive	Chairman Bert Roberts	CEO Gerald Taylor	President Timothy Price
Retention bonus	$10.5 million	$9.5 million	$9 million
Minimum severance pay	$6.9 million	$4.5 million	$3.5 million

NOTE: Bonuses are in addition to salaries, stock options and other compensation.

Another prominent national ISP, PSINet, Inc., which has no traditional local exchange business, said it has no problem with the merger deal.

"The key here is to make sure UUNET and WorldCom and any of the other large carriers do not start charging based on the number of packets shipped," said PSINet CEO William Schrader. "But if UUNET does start charging [based on packets shipped], then those customers will come to us. WorldCom will make a correct decision for the market and the customers will vote with their feet and move to PSINet." ■

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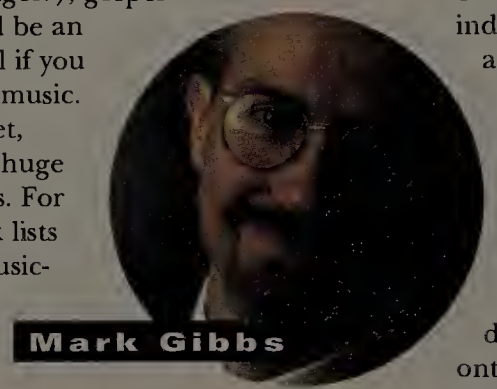
Backspin

Digital media — music and copying

If Beethoven had been killed in a plane crash at the age of 22, it would have changed the history of music . . . and of aviation.

— Tom Stoppard, playwright

Music is one of mankind's greatest passions. Whether you like highbrow or lowbrow, country or pop (is there a difference any longer?), gospel or soul, you would be an unusual individual if you did not like some music.



Mark Gibbs

On the Internet, music fans have a huge range of resources. For example, Infoseek lists almost 185,000 music-related Web sites. I have sampled only a handful of these sites, and among my favorites is the Internet Underground Music Archive (IUMA), which can be found at www.iuma.com.

IUMA specializes in indie music (for the non-hip this means independent, as in not with a mainstream record company) and, as far as I can determine, was the first to offer legal samples of musicians' works. Today, IUMA provides thousands of samples covering just about every genre. For example, if you sort through IUMA's index you can find the AlterNet Sonic Reality label, self-described as a small indie cyberlabel where you can hear snippets of the likes of Zoar.

<I digress> Zoar's work is described like this: "The musical landscape of Zoar is painted with ambient sound, surreal clouds of keyboards, deathly dark drones and a life force of crying, distorted guitar. It is both natural and industrial, visual and metaphysical."

In my humble opinion, music reviews are one of those art forms that should be dumped in the cultural trash bin along with macrame. To quote the great jazz pianist Thelonious Monk, "Writing about music is like dancing about architecture." </I digress>

While IUMA may have started the practice, the major labels have gone in for giving away digital tastes of albums in a big way. But immediately we run headlong into the issue of copywrong.

For instance, take a sample of some artist and mix it with other samples and sounds to create a new work and you will get a composition that will attract entertainment lawyers like a garbage bin gathers flies. And the issue of sampling is the thin end of a particularly worrisome wedge of copyright infringement for the music industry.

Ultimately, the music industry would like to be able to distribute complete albums over the Internet. It wants you to connect to the label's site, pay a fee by credit card or electronic cash and download the music to a device that can record onto a CD.

But the industry is concerned about how easy it will be for consumers to duplicate copies of downloaded CDs without further payments. And the music industry is not the only one with this problem. Magazine articles, videos — indeed, any work on paper or in digital form — is perfect for electronic distribution and, therefore, for copyright abuse.

What is interesting is that illegal duplication is already rampant without the Internet. How many of you buy CDs and then tape them to play in the car or for friends? How often have you photocopied a newspaper article or section of a book?

To use the Internet for distribution, media companies are investing in all sorts of technologies, such as digital watermarking schemes, that ultimately will not work. They won't work because anything that can be hacked, will. That's a fact of life like death and the lack of taxis.

The reality of digital media is you have to accept that you can't get paid for every copy, or you have to continually add value that people are willing to pay for incrementally. The former is going to be hard for media companies to live with, while the latter completely changes our view of what artists do in electronic media.

Your column reviews to nwcolumn@gibbs.com or dish it out at (800) 622-1108, Ext. 7504.

'Net Buzz

The latest on the Internet/intranet industry

By Chris Nerney

INTERNET OF THE APES Primates rule the Internet.

And let's face it, that's not such a bad thing. After all, if dogs controlled cyberspace, every Web site would be covered with fleas, hair and drool, rendering anything less than a T-3 line useless. (Hey, we kid the canines. We kid them.)

Nonetheless, we were surprised to learn recently that on the 'Net, we humans are not alone. Lurking in the cybermists are all manner of gorillas, chimps and monkeys.

We know this because of *The Gorilla Game*, a book due out next month that promises to help investors pick the winners in high technology.

Those winners, the authors say, evolve to dominate their respective markets, becoming "gorillas," if you will. "Chimps" are defined as failed gorillas, while "monkeys" are companies that clone gorilla technology and sell it at lower prices.

Microsoft, of course, is a gorilla, as is **Cisco.** But who are the gorillas of tomorrow, particularly in the Internet jungle?

Authors **Geoffrey Moore, Paul Johnson** and **Tom Kippola** don't really say. Rather, they try to show readers how to arrive at that answer themselves. The writers do, however, offer predictions about which Internet technologies could offer promising opportunities for investors.

The first is supply-chain commerce, "a truly killer app," the authors write. Internet-enabled electronic data interchange would eliminate the "low-value, high-cost paperwork that currently taxes most business transactions," they say. Gorillas such as **IBM** and others such as electronic commerce vendor **Sterling Commerce** already are positioning themselves in this market.

Another potential megamarket, according to the book, is consumer purchasing, even though current transaction volumes "are relatively minuscule."

The book also sees investor potential in network computers for the classroom ("a **Gutenberg**-sized impact"), as well as interactive programming and voice/video conversation. *The Gorilla Game* is published by HarperBusiness and costs $25. That's $175 in dog dollars.

@BACKUP GETS BACKED AGAIN Web-based data backup vendor **@Backup Corp.** has closed a $9 million second round of venture funding with several investors.

Among the investors is **American Express,** which bought into @Backup after testing its software and services with small-business customers for the past year.

The company's original investors, **Enterprise Partners, Alta Partners** and **Security Pacific,** also contributed to the new round, as did newcomers **Windward Ventures** and **Cendant Corp.**

For as low as $30 per month, @Backup offers mobile professionals and PC users in small offices automatic nightly backups, off-site data storage, encryption and hard-drive virus scans.

Founded in 1995, @Backup is based in San Diego.

DIGITAL ISLAND DREAMS Honolulu, as we all know, is located on a Hawaiian island called Oahu. But given the way a Honolulu start-up that offers multinational intranet services is pulling down venture funding, Oahu could someday be known as **Digital Island.**

Digital Island — the company, not the body of land — has just closed a $10.5 million venture round, with several investors contributing. Since last March, the company has raised $22 million.

Digital Island sells Internet services to multinational corporations that want to avoid the congestion of the public Internet. The company delivers digital content and applications via its own private Internet, which connects back to the public 'Net.

The start-up provides services in more than 30 countries and counts **Cisco** among its customers and partners.

Investors in the latest round include **JAFCO American Ventures, Inc.** and **Partech International.**

'Net Buzz for too long has displayed the hubris of the species-centric Homo sapien. But no more. We invite all primates — humans, apes, marketing executives — to send us their best Internet- and intranet-related news. Contact Chris Nerney at (508) 820-7451 or cnerney@nww.com.

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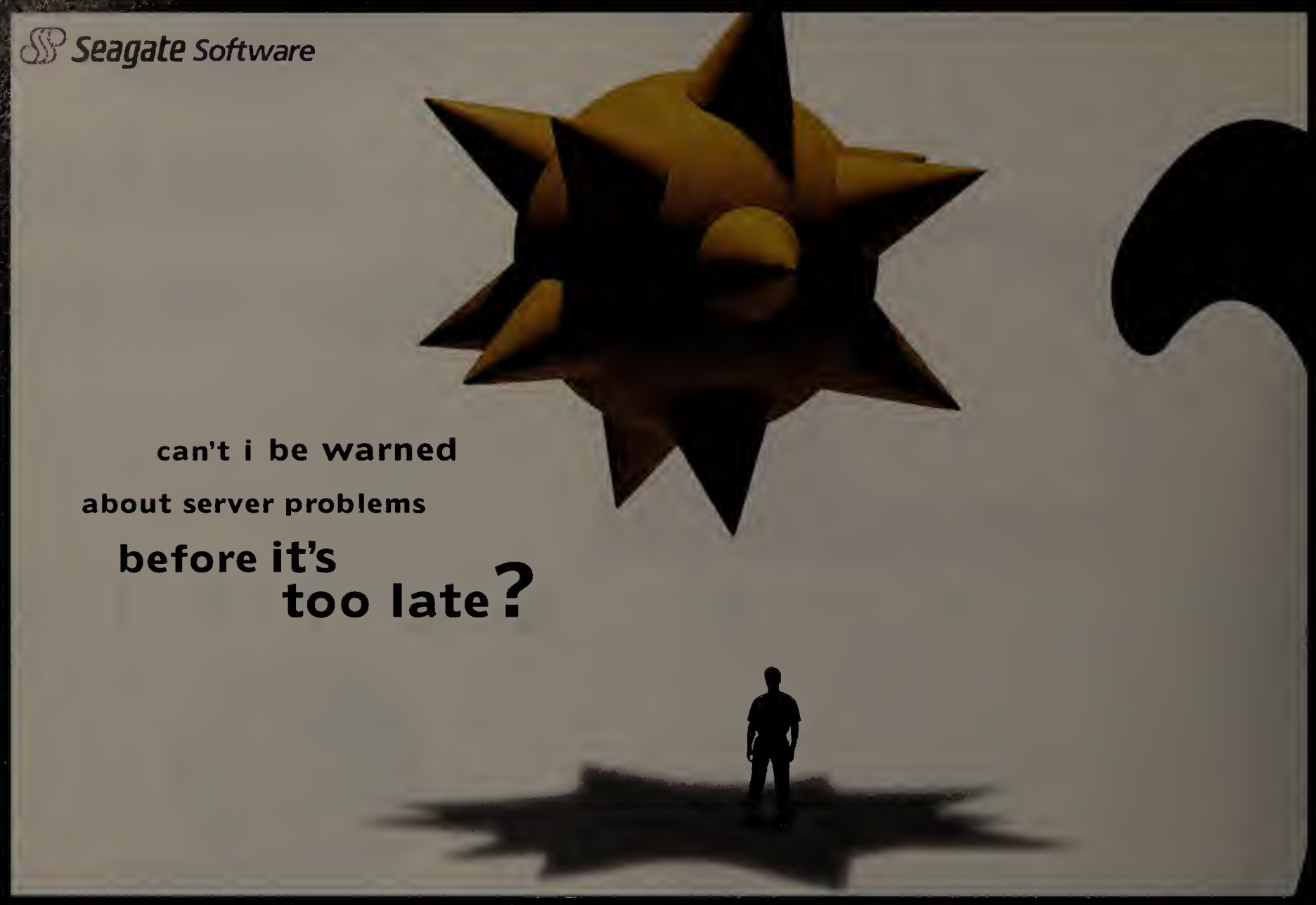

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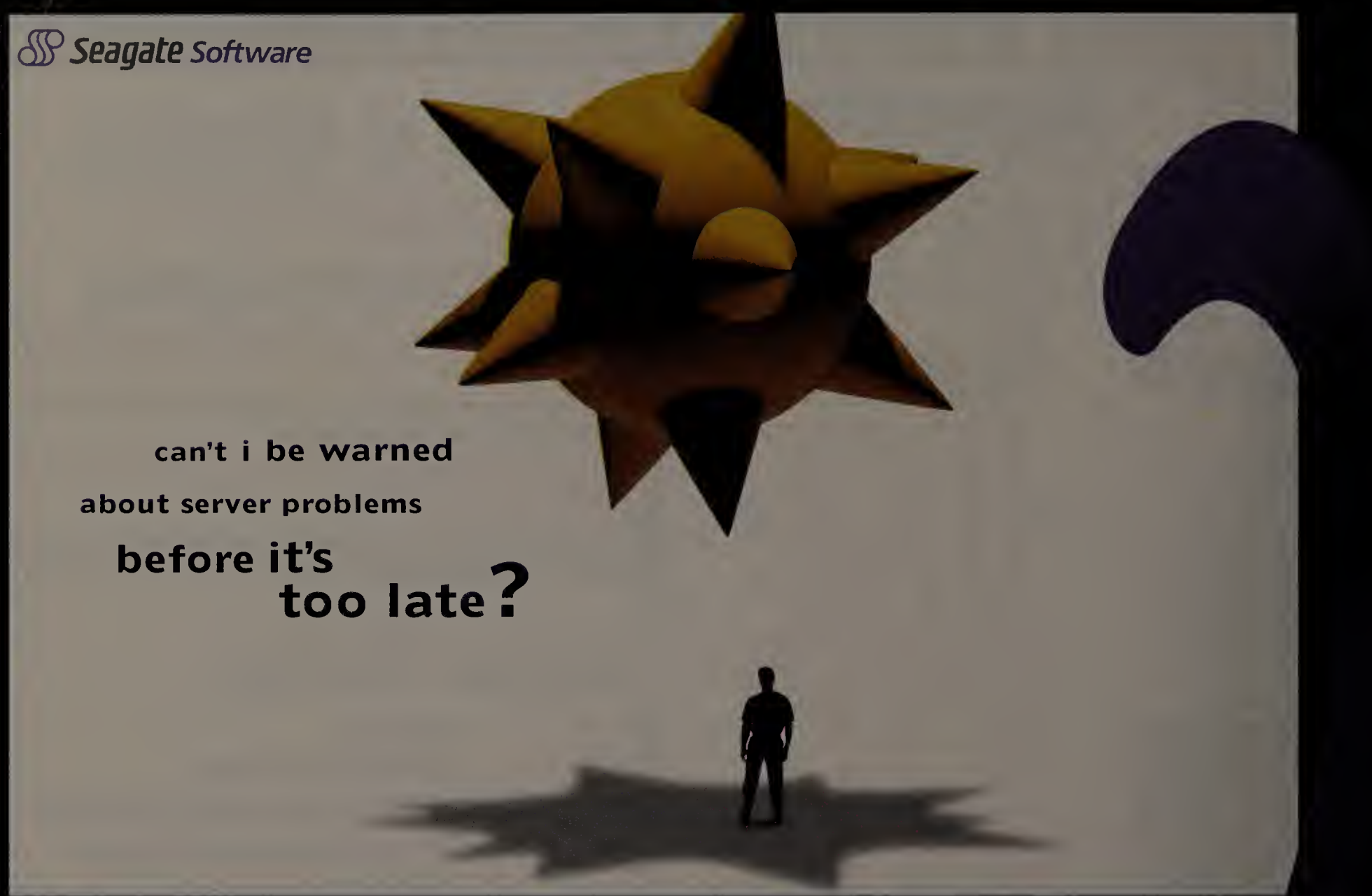

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about server problems

before it's too late?

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